Digital society and digital citizenship

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1. Digital Society

The number of internet users is expected to rise to around 4.14 billion in 2021[1] and they are making increasing use of digital opportunities. In Germany alone, around 19 million people order food at least once a month via online portals[2]. What was unthinkable years ago is now common practice. Applications are sent by e-mail, people continue their education via online courses and official channels are handled via online administrative portals. Digital progress and its technologies have penetrated almost all areas of human life and determine everyday life. The smartphone has become a constant companion and apps a must-have. Street maps are obsolete, google maps help, and it takes only seconds to find out when the tram, train or bus is coming. The main thing is that there is enough data volume available These digital tools create such a dependency that life without a smartphone, internet access and the like is no longer imaginable. Society is undergoing an immense transformation as a result, which justifies the term "digital society".

This technology has significantly shaped society in terms of its values and norms and influences areas such as politics and the economy as well as every individual in an increasingly globalised world. The opportunities and risks of a digitalised world arising from this will be shown in the following. This includes fact-oriented knowledge as well as socially relevant questions.

e-Democracy/e-Government / eParticipation / e-Voting		
He / She knows the most important digital technologies, their capabilities and possible uses		
Knowledge	**Skills**	**Competence**
He/She • understands that every citizen has a right to political participation • understands that the internet influences democracy • understands the theories and methods of e-Participation • understands that e-voting creates an additional opportunity for participation in political events • understands that e-democracy can have both positive and negative effects on change in some areas	He/She can • recognise the changes using concrete examples from the internet • identify the e-participation opportunities based on the theories and methods. • recognise the wide range of e-voting possibilities using concrete examples from the internet. • use concrete examples from the internet to recognise which posts, personal data on the net could entail dangers	He/She is able to • use e-democracy tools according to his/her needs • evaluate benefits and threats of e-democracy • derive participation possibilities for him/herself from the theories and methods. • evaluate advantages and disadvantages of e-voting • demonstrate democratic participation possibilities on the internet

- What actually is a digital society and who sets its rules?
- How do we use social media and what should we pay attention to?
- What networking opportunities does modern technology offer us and what helpful tools can sustainably improve our digital lives?
- How do we want to interact and live with each other in the future?

1.1 E-democracy

In order to be able to decode the term e-democracy, it is first necessary to deal with the concept of democracy. Without exception, a democracy can be defined as a form of government whose power and government emanates from the people, i.e. which guarantees popular sovereignty. Sovereignty is synonymous with self-determination, ergo the people decide for themselves. In order to realise political decisions, decision-making in the sense of the majority principle is needed. This generally means that decisions are made by the majority will of the people. (Special forms of democracy as well as proportional representation vs. majority voting are not considered here for the sake of simplicity). Free elections are one of the most important features of a democracy, but not the only one. Modern democracy invokes a granting of fundamental and human rights, such as the right to freedom of expression, the right to life and physical integrity, the right to freedom of assembly and freedom of the press, the right to freedom of belief and freedom of conscience. In addition, all people are equal before the law.[3]

Another feature of a modern democracy is the separation of powers, and is intended to ensure that one and the same institution does not exercise different functions of power and that a person may only belong to one of these institutions in order to avoid abuse of power. The three powers, legislative, executive and judicial, thus control each other.[4]

The legislative branch, legislation, is responsible for passing laws. The executive administers the legislation. The judiciary represents the judicial branch, i.e. it provides courts and judges.

These democratic principles are not self-evident in every country. In most European countries, features of a modern democracy can be found.

But what is electronic democracy all about? Digitisation has taken place in all areas of social life over the last 20 years. Whether in business, politics or at home in our own four walls. The internet has revolutionised many things. The penetration of the internet into the democratic system has created new possibilities for communication and cooperation for citizens and political actors. Whereas in the past only print media, radio and TV were available as political information media, today political news can be accessed via the internet at any time of the day or night. Discussion platforms and civil rights initiatives promote a living democracy. Thanks to the further development of the internet (from Web 1.0 to Web 4.0), new forms of collaboration, participation as well as electronic voting procedures and simplified administration have opened up to people.[5]

Electronic democracy can thus be understood as an extension of democratic possibilities, that of the virtual space. More transparency, access to information and opportunities for participation are intended to further develop democracy and, above all, to strengthen it. Electronic democracy is supported by three pillars: the electronic administration of administrative-democratic processes (e-government), various forms

of participation in political discourse (e-participation) and democratic interaction such as electronically supported elections (e-voting).[6]

From Web 1.0 to Web 4.0

Web 1.0 refers to the first phase of internet use, when people (mostly companies) were first able to provide information on the internet and also web content. Internet users could only consume this information. As the internet evolved, social networks such as Youtube, Facebook, Xing and other services celebrated their internet debut. This new era allowed users to communicate with each other, produce content themselves (the "participatory web") and went down in history as Web 2.0. With the idea of Tim Berners-Lee, creator of the World Wide Web, to relate web content to each other, Web 3.0 was born. Through meta-data, intelligent algorithms and the use of web applications, applications can "learn" to recognise patterns and order them according to relevance. Web 4.0 finally heralds the age of artificial intelligence, which voice assistants such as Siri or Alexa put to use. [94]

1.1.1 E-Government

E-government means services provided by the state administration for the population and for businesses. "By electronic government we mean the handling of business processes related to governing and administration (government) with the help of information and communication technologies via electronic media".[7]

How does this electronic governance system work in practice? Important for the functioning of an electronic form of government is cooperation at all levels of government, business and society. Basically, a distinction is made between three dimensions of e-government:

- Government-to-Citizen (G2C) extends to the information and interaction process between the government and the people.
- Government-to-Government (G2G) is the communication between government and administrative bodies that is carried out by the authorities.
- Government-to-Business (G2B) means the processes between government and business enterprises.[8]

The focus of this chapter is primarily on government-to-citizen and the associated opportunities for participation and cooperation on the part of society with government. The personal and technical prerequisites for dealing with electronic administrative systems and the advantages and disadvantages that result from them will be explained in more detail in the following.

Government-to-Citizen (G2C)

Government-to-citizen describes the communication process between government and the population. In practice, this means the electronic official channel. Tax returns, registration confirmations, change of residence, building notifications, applications for social benefits and/or similar applications can be carried out in electronic form. Depending on the standard of the respective European country, these electronic applications can be carried out by means of an electronic signature (see also: Requirements for the use of administrative systems). The electronic signature is an integral part of secure e-government and ensures the identity and authenticity as well as the integrity of written documents.[9]

Eurostat data show that more than half of the population in 25 out of a total of 34 European countries perform public services electronically. Denmark is the front-runner. 89% of the Danish population uses e-government to carry out public services. Austria is in the top third with 59%, Germany in the middle with 58% and Spain with 49%, and Romania brings up the rear in the EU with 9% (Eurostat Data 2019).

Compared to the last few years, the number of users is increasing. This form of contact, communication and exchange of documents allows for more flexible dealings with the offices, but requires basic technical knowledge.

Source: https://ec.europa.eu/eurostat/de/web/products-eurostat-news/-/EDN-20200307-1

Requirements for the use of management systems

In order to be able to use electronic administrative systems, participants must have sufficient literacy skills in the respective national language. It also requires a certain level of digital competence as well as appropriate basic technical equipment. E-government takes place exclusively electronically. Some administrative systems require an electronic signature or citizen card to process applications. This electronic signature or citizen card functions as an electronic identity card or electronic signature. It confirms the identity of the citizen (BMDW Austria).

Advantages

From the citizens' point of view, an online administrative system offers more flexible options. For registration and de-registration of residence or vehicle registrations, official channels are no longer necessary. Online queries for registration information, land registers and company registers facilitate the daily work of companies. The electronic completion and submission of applications is made much easier by the use of digital tools. Passports and identity cards can also be applied for easily from home in some countries.

From the point of view of the authorities, uniform IT solutions save considerable costs. Passport applications, lost property and vehicle registrations are processed in the same way in every municipality. Thanks to the supra-regional networking of the authorities, data such as registration data or land register entries can be determined quickly. Fewer administrative assistance procedures (residence enquiries, social security enquiries) are required and the sending of notifications and communications, e.g. in the case of a change of civil status, is no longer necessary

.

Disadvantages

But as easy as it is to exchange data and information, it is even more difficult to protect their content from unauthorised persons. Critics fear that the implementation of e-government systems does not sufficiently protect people's privacy. The Transparent Man is emblematic of the rampant collection of personal data by public and private institutions. This could result in the complete loss of the right to privacy and self-determination. In addition, communication between public authorities and citizens will become much more impersonal. Especially in the case of extraordinary concerns, it is feared that solutions cannot be negotiated online.

But there are also concerns about data protection on the part of the authorities and the ever-increasing need for security is seen as detrimental. More complex IT architectures with good infrastructure and sophisticated support options for citizens are needed. Digital dependency, coupled with the internet, no longer allows for manual processing. If the system fails, the authority cannot work.[10]

1.1.2 E-participation

The word participation is derived from the Latin "participare" and means to participate. E-participation therefore means internet-based procedures that enable the population to participate in political processes. Technological developments provide new opportunities to access information, to get involved as a person and to help shape the process.[11]

eParticipation distinguishes between formal and informal forms of participation, according to which formal forms of participation include those procedures that are prescribed by law in the respective countries, such as various licensing procedures in some countries. Informal forms of participation primarily mean opinion polls. These are not prescribed by law. Before decisions are made by politicians, electronically supported opinion polls can be carried out in order to include these opinions in the decision-making process.

In addition to the legally defined forms of participation, the exchange of communication, i.e. political communication between citizens and politicians as well as between citizens themselves, represents an important participation opportunity. Initiatives, actions, online petitions and exchange of opinions on social networks are instruments to actively and passively participate in political events.

Across the EU, there are now numerous online initiatives, online platforms or online petitions, such as change.org or ECIT Foundation.

www.change.org

Change.org is one of the world's largest platforms for electronic participation. Citizens can use the platform to start petitions, campaigns and initiatives on local, national and global issues.[12]

www.ecit-foundation.eu

The ECIT Foundation advocates for more citizenship rights for European citizens and is a public foundation working exclusively on the concepts of European citizenship. It brings together civil society activists, academics and policy makers to build a clearer consensus on how this dispersed transnational citizenship should be developed. The aim is to initially provide a web platform on European citizenship, considered as a multi-stakeholder, multi-disciplinary project, bringing together the elements of citizenship, engagement and trust that are part and parcel of any citizenship.[13]

Advantages

E-participation results in a strengthening of political discourse. Especially through online citizen discussion forums, people can deposit personal concerns independent of time and place, and politicians can react more quickly to the wishes of the population. The reach through digital participation is also a key factor in bringing more people together to participate in political decision-making. Especially to increase voter turnout, digital participation seems to be a proven means. But more on this under e-voting.

Disadvantages

In terms of equal opportunities, however, it must be taken into account that digital participation is only possible for a certain part of the population, as not all people have access to the internet yet. Older people in particular, but also those who are socio-economically worse off, are denied this form of political participation.

1.1.3 E-voting

E-voting or electronic voting was originally an electronic tool for counting votes in polling stations. Today, it is the first approach to conducting elections from the comfort of your home via your home PC, laptop or smartphone.

The first European country to introduce e-voting is Estonia. A nationwide system was implemented here as early as 2005. Switzerland has also been working on introducing e-voting in the country since 2000. In the EU countries, the development of e-voting is at different stages and includes different approaches. Austria, for example, rejects e-voting due to security concerns. In Germany, too, the implementation of e-voting was abandoned after the 16th Bundestag election. of e-voting after the 16th Bundestag election. The Constitutional Court criticised that the principle of publicity of an election, which has to guarantee regularity and traceability, was not given to the required extent. For example, the complexity of e-voting was not apparent to all voters. Also, the security of the technical systems seemed not to have been guaranteed.[14]

In Spain, it was possible to cast votes for the regional parliamentary elections in 2003. One year later, e-voting was carried out nationwide and the result was positive. In principle, e-voting must guarantee the principles of electoral law. However, the secrecy of the voter's personality and freedom can be endangered by electronic voting.

Advantages

By means of online voting, the election results can be counted and published more quickly. In addition, enormous costs are saved in the long run. It is also expected that there will be a higher voter turnout. It is expected that younger voters will use the new technologies, citizens of foreign countries will be able to meet deadlines more equitably than via postal voting, and citizens who cannot go to polling stations will be able to cast their votes from the comfort of their homes.

Disadvantages

Experts fear that e-voting is accompanied by insufficient reflection. It can be done quickly and without having to think long and hard. This devalues the act of voting itself. In addition, people who do not have access to the internet or sufficient skills in technical application may be disadvantaged. There is also the danger of cyberattacks, which can lower confidence in the election results. Other sources of danger are electoral fraud and also the influencing of voters by other people. In addition, experts see the anonymity of the vote as being at risk.[15]

1.1.4 E-health

E-health, also called electronic health services or electronic health records, is a collective term for digital tools and services that serve prevention, diagnosis, treatment, monitoring and administration in the health care system. Through the use of so-called information and communication technologies, comprehensive information and data can be exchanged between patients and the health care system.[16]

Citizens' health data is collected and evaluated digitally. This requires a well-developed infrastructure and a high level of data protection, because the generation of health data also increases the risk of abuse.[17]

Conversely, e-health enables patients to be treated more effectively and faster. Artificial intelligence can help detect diseases earlier, and telemedicine also overcomes the greatest distance between doctor and patient. The use of digital solutions and services also results in an immense financial reduction in healthcare costs.

The Electronic Health Record

The electronic health record is understood to be the digital patient record. It is a database that stores various patient data. This includes treatment data, allergies, previous illnesses, medical history, medication and so on. The purpose of this health record is to enable doctors, pharmacists and nurses to access patients' data at any time without wasting time. In the European countries, the In the European countries, the technical and personnel implementation of the electronic health record is handled differently.

In Austria it is not obligatory and it is possible to opt out of the Electronic Health Record. The Electronic Health Record - ELGA for short - stores a wide variety of data such as findings from specialists, living wills, health care proxies, prescribed medication and the like. The data is stored for 10 years, the medication data is only stored decentrally at the creator for one year. However, it is up to the patient which data is stored. In principle, the storage of certain data can be refused.[18]

In Germany, regional models have been under investigation since 2011. Spain, however, is considered a pioneer in the field of electronic health records, having introduced a form of electronic health record as early as 2006. introduced.

Advantages

The electronic health record enables doctors to access patients' data quickly and without bureaucratic effort. This could be life-saving, especially in emergencies, for example if the patient has pre-existing conditions or allergies to medication that a doctor cannot immediately identify. Patients themselves can also store and manage data. In addition, depending on the model, referrals, prescriptions and doctor's letters can be issued quickly and easily. Moreover, the data can be used anonymously in research to identify and combat patterns of disease. In addition, the electronic health record could have a positive effect on the density of care, as medical knowledge can be accessed regardless of time and place, and can thus prevent overtreatment. Overall, financial resources can be better managed. [19]

Disadvantages

According to experts, many doctors reject electronic health records because they believe that handwritten records are more detailed. A major danger lies in the protection of data, also in terms of medical confidentiality. Input errors or manipulated entries and misdiagnoses can lead to wrong medical diagnoses being made and even wrong medication being administered. Not to forget that politicians, health insurance companies and insurers or even employers have a great interest in the data. Data protection is a very big issue here. Moreover, critics point out that the digitalisation of health data could evoke socially undesirable commercialisation tendencies. With the flood of electronic possibilities to collect health data, such as through fitness apps or wearables / smart clothes, there is a wealth of data that is not always trustworthy, difficult to interpret and cannot be sufficiently evaluated.[20] Accordingly, critics fear that health insurance companies will promote so-called wearables in the future, but that their evaluation could lead to increases in insurance premiums. Movement patterns alone can be used to predict future illnesses. For this reason, users should be aware of the deliberately set playful incentives and pay attention to where this data is stored and into whose hands it ends up.[21]

EU project Smart4Health

Smart4Health is a project funded by the European Union. The aim is to develop an app for EU citizens with which they can manage health and fitness data. Each individual decides which data is uploaded and which is not. With the help of this app, access to the personal health record is possible in every hospital throughout the EU.[22] However, this app also offers numerous other functions. For example, users can decide with whom which content is shared or whether they want to make their health data available for research. This can also be revised again later.[23] The technical management is handled by the Digital Health Center (DHC) at the Hasso Plattner Institute (HPI) and "the data should be 100 per cent secure," according to Peter Osburg, product manager at HPI GesundheitsCloud gGmbH."[24] Wo die Daten gespeichert werden, wird jedoch nicht bekannt gegeben.

Three e-health examples from practice:

Sharing is Caring

"Patients Like Me" is a US platform where people can share their health stories and data to help patients with similar conditions faster, identify disease triggers and provide relevant data for research.[25]

When using the platform, it must be taken into account that even the release of a few data such as birthday, photos or other personal information in one's own profile provides information about one's identity.[26]

The doctor rides with

At the Consumer Electronic Shows 2019 in Las Vegas, Garmin and Mercedes Benz showed how health data can be used in everyday traffic. The idea of the large corporations was to connect smartwatches and vehicles with each other. The vehicle can use the driver's heart rate to adjust the volume, climate and lighting so that the driver is less stressed or tired.[27]

From German research

In the "Aetionomy" project, the Fraunhofer Institute generates data for dementia and Parkinson's research using a Big Data approach. data for dementia and Parkinson's research. The aim is to develop a model-based approach to better understand the causes of Alzheimer's dementia and Parkinson's disease and to make an earlier diagnosis. The data and knowledge collection is based on the principle of "knowledge discovery" and the modelling of complex biomedical processes with the aim of identifying new disease mechanisms.[28] Knowledge discovery in databases is the process of selecting, processing and evaluating large collections of data in order to put previously unnoticed, undiscovered facts into context and derive explicit knowledge.[29]

2. How digitalisation is changing our everyday lives

"In the next ten years, we will reach the point where almost everything will be digitised."
Satya Nadella, CEO Microsoft, 2013

The age of digitalisation has led to enormous social change. The effects affect not only new technologies, but all areas of everyday life. Whether professionally or privately, almost nothing works without digitalisation. Communication with the smartphone in the smart home is already standard for many. Digital assistants for concluding contracts or while driving are always ready to serve society. But not all people view the trend positively. This is particularly dependent on whether or not their own ability to act is restricted by it. This is clearly illustrated by the example of digital communication. If people experience digital communication as enrichment, digitisation tends to be evaluated positively. However, if digital communication is held responsible for the decrease in interpersonal contacts, this leads to a negative evaluation of digital development. Critical discourse is of central importance! And the correct handling of information and data is becoming increasingly important. How "transparent" can everyday life become?
The implementation of digital technologies in private, public and economic life raises many questions. What is behind all the digital innovations and what techniques are used to make information go viral globally? How is information generated and knowledge constructed?

Digitisation in everyday life		
He/She is able to recognise disruptive technology and understand the positive and negative impacts.		
Knowledge	**Skills**	**Competence**
He/She • understands the importance and scope of digitalisation for everyday life. • understands the importance of disruptive technologies • builds up knowledge about digitalisation and is thus better able to deal with it in everyday life	He/She can • describe possible consequences of increasing digitalisation in personal everyday life • describe the positive and negative impacts of disruptive technologies. • identify positive and negative aspects of the digitalisation of everyday life.	He/She is able to • personally evaluate the use of digital technologies in everyday life. • evaluate disruptive technologies. • evaluate, select and use digital technologies for him/herself.

2.1 Collective and collaborative knowledge construction

Wikipedia.org, a prime example of knowledge construction, is a free online encyclopaedia with free lexical entries and articles on a wide range of topics, which is one of the ten most frequently accessed websites in the world.[30]

Users can read entries as well as write and edit them. An article can be written by several authors, as demonstrated by the article on the Fukushima natural disaster. More than 300 authors contributed to this article, which was rated as very good by leading experts. More than 10,000 new articles are published on Wikipedia every day.[31]

But how do these knowledge construction processes work?

Historically, the focus of consideration shifted from individual knowledge to that of collective knowledge. Earlier research, based on Piaget's (1932) cognitive constructivism, looked at individual learning as the construction of information representations. This developed into dynamic, participatory knowledge processes and practices and promoted discourse in a group or community. Collaborative learning needs community and shared engagement in the construction of knowledge. The shared meanings and contexts of meaning negotiated in discourse are not fixed and can be interpreted and redefined by individuals.

Further developments of this classification are the result of long-term collaboration processes that are linked to and mediated by the development of shared abstract ideas and dynamic productions, such as the digital knowledge objects.

The aim of CSCL - Computer-Supported Collaborative Learning is to support the social collaboration process between learners. Web 2.0 is of particular importance in the CSCL context. Computer-Supported Collaborative Learning promoted new phenomena of mass collaboration. One of the best-known knowledge construction projects is Wikipedia.org.[32] Wikipedia.org is a self-organised process, so to speak, in which all participants define the norms of an article and apply them to further articles. Authors develop further on the basis of mutual exchange and transfer knowledge through cross-referencing.[33]

Knowledge transfer as the core of the knowledge society has conquered numerous areas of human everyday life. Especially in the professional sector, this process has become indispensable, but it also encounters resistance. This is because knowledge transfer requires trust, especially in the professional environment - within individual organisations, but also within organisations.[34] In addition to technological progress, knowledge transfer depends above all on the willingness to use these technologies.

2.2 Disruptive technology society

New, constantly changing technologies determine everyday life in the 21st century. Digital technologies fulfil social needs and expectations ever faster and more effectively. New technologies are constantly being pushed forward and one upgrade follows another. Only those who are innovative, the first, the best, are competitive and can survive on the market. Disruptive technologies prevail for precisely this reason - the unique selling proposition.

Disruptive, derived from the English "to disrupt", means to disturb or interrupt and describes new technologies, which should not be understood as further developments of already existing technologies, but rather mean the development of completely new technologies. Disruptive technologies live from the digital provision of personal data that is collected and processed.

Whereas in the 20th century shop assistants from the corner shop still knew our preferences, in the 21st century the algorithm of e.g. Amazon recognises these preferences and sends us offers tailored to our preferences.[35]

Especially in the start-up scene, disruptive technologies are the drivers of success par excellence and do not necessarily strive to destroy traditional technologies with these new technologies, but rather work on optimisation processes. These make existing technologies obsolete, as the use of these is then no longer advantageous.[36] The competition usually cannot react quickly enough to disruptive technologies. Kodak and Nokia are examples of how disruptive technologies can suddenly take hold and force previously well-known companies and their products out of the market.[37] Both were market leaders in their field for years.

Kodak achieved worldwide fame with Polaroid photography and launched the first digital SLR camera in 1989. In 2012, the company filed for bankruptcy. Nokia was the market leader in the 1990s with its mobile phones. Then came the smartphones.

2.2.1 Examples of disruptive technologies

Disruptive technologies conquered and permanently changed numerous industries - especially in the area of services and commerce. Clyton Christensen, former Professor of Business Administration at Harvard Business School, can be considered the founder of the term disruptive technology. Christensen created a clear distinction between the term **disruptive** and the term **innovative**. Innovative and disruptive technologies can generally be described as innovations in technology, whereas innovations in disruptive technologies can be ascribed the fact that:
„Disruption describes a process in which a small company, often with few resources, challenges a successful established business. This is because established companies usually focus on improving their products and services for their best and most lucrative customers, neglecting other customer segments. This is exactly where disruptive companies start. They offer simpler products usually at a lower price. Because the established companies are primarily concerned with better profitability in the lucrative segments, they often do not pay attention to this. The disruptive companies then slowly work their way up and deliver what the majority of customers want. These gradually adopt the new offerings and thus disruption happens."[38]

The market is reshaping itself. **Amazon**, for example, developed from a smart business idea into a retail giant that significantly "disrupted" many industries. Since then, local bookshops have been struggling to survive, as have electronics stores. Amazon can offer cheaper and better delivery conditions than local competitors. Especially during the Corona crisis, Amazon proved to be a company with enormous growth opportunities and achieved a net profit of around 6.3 billion US dollars in 2020. Compared to the previous year's net profit of 2.1 billion US dollars, an extreme increase.[39]

Paypal - the online payment system par excellence - showed successful banks that they can lose market share forever to newcomers. Paypal revolutionised the payment system in online retail and has now acquired more than 277 million customers. In 2019, the company generated around 17.772 billion US dollars. Paypal scores above all with the fact that the online payment system is easy to use and stands for seller and buyer protection as well as data security online.[40]

Buyer Protection on Paypal means that if "eligible orders do not arrive or do not match the listing description, customers will be refunded the price."
Buyer Protection on Paypal means that if "eligible orders do not arrive or do not match the listing description, customers will be refunded the price." .

In the literature and on internet sites, **AirBnB** as well as **UBER** are often rated as disruptive technologies..

AirBnB the online platform for renting and booking accommodation, was founded in 2008 by Brian Chesky, Joe Gebbia and Nathan Blecharczyk. AirBnB is short for "Airbedandbreakfast" since 2019. According to Chris LeHane, an AirBnB employee, the idea of making money from what is usually the highest cost in a business is visionary.[41] In the case of AirBnB, it would be the rents for living space. On AirBnB, rooms, flats, houses and apartment complexes are rented out for a day to several months. The living spaces are the homes of private individuals. AirBnB only provides a platform for this purpose. Landlords can place their offer online and pay AirBnB a service fee. Those looking for accommodation can then select a suitable accommodation from the offer and book it directly.

This model brought and brings the classic hotel industry into trouble[42] and AirBnB is confronted with a flood of lawsuits, because private AirBnB landlords make profits without paying taxes. The hotel industry speaks of fraud and has been fighting against it for years. [43]

Putting all offers online is not only the central idea at AirBnB, but also at **UBER**. UBER was founded in 2009 and offers ride services in 450 cities in 76 countries. The company was founded with the aim of positively influencing the environment in that by using ride-sharing services, there would be less congestion on the roads, the run on parking spaces would decrease and, as a result, CO2 emissions could be reduced. Travis Kalanick, founder of UBER, said in an interview that UBER would "improve the way cities move forward, avoid congestion and reduce air pollution". UBER actually follows the same approach as AirBnB. UBER arranges rental cars and rides on an online platform without owning them.

And it is precisely in this approach that Christensen sees no disruption, as these innovative ideas are based on simply using existing resources differently. In this case, Christensen speaks of incremental innovation."[44] This means that already existing products are permanently optimised, like cars, which offer more and more safety and space.[45] In contrast, Apple has pushed ahead with innovations that did not, so to speak, further develop the telephony of the iPhone, but converted it into a personal computer.[46]

That the term "disruptive" is by no means finished in its interpretation and definition is shown by the academic discourse that is being conducted in various departments, not only at Harvard University..

Other examples of disruptive technology include:

- Smartphones
- Messenger apps
- Google Maps
- Kindle & Audible
- Facebook, Instagram & Co

2.2.2 The downside of disruptive technologies

Bill Hunt, founder of Dianomic, understands disruptive ideas as ideas that make something better. Thus, in his view, the goal is not to lower prices from one dollar to 95 cents, but to say goodbye to old structures and find new, better models.[47]

Share economy ideas are also ideas of disruptive technology. The basic principle of the share economy is to make property and possessions accessible to other users. It is not absolutely necessary to exchange goods and services for money, but to push for other ways of payment. The sharing economy has emerged in recent years due to digitalisation and the emergence of social networks and online platforms. This has made it possible to initiate the so-called match-making process, in which providers and consumers are brought together. The spectrum of the share economy ranges from swapping, renting, sharing and lending to selling, giving away and offering services such as services or knowledge in the form of wikis.[48]

However, some concepts do not only bring benefits for people and the environment. Two examples will illustrate these negative consequences of disruptive technology:

Taxi drivers all over the world have gone on strike against the UBER company. The reason for this is that UBER undercuts conventional prices enormously. This has the effect of destroying social and economic structures. In India, for example, UBER has promised taxi drivers a new kind of more flexible job with higher profits. UBER also supports newcomers in taking out loans to buy a car. This is because a car of one's own is necessary in UBER's concept in order to be able to offer car rental or car rides at all. However, the growing oversupply of services through UBER did not result in a better income for the drivers - quite the opposite - the turnover of the individual drivers declined. Many slid into a financial and even existential crisis that was no longer manageable for many. Suicides within this occupational group increased drastically.

AirBnB is also in the crossfire of criticism. There are demonstrations against AirBnB in numerous cities such as Barcelona and Berlin. Especially in cities heavily frequented by tourists, where housing is rented or sublet to tourists, this increases the housing shortage and drives up rents. For locals, housing is becoming increasingly unaffordable. Local governments are under enormous pressure to create regulations in this context, as criticism is also growing from the hotel industry. They are demanding that landlords be taxed in the same way as they are.

These examples show the dark side of disruptive technologies and the next generation of these technologies are already at the start. How these will affect work processes is predictable: In even higher efficiency. Many jobs could be rationalised away. According to a study by professors at Oxford University, 47 per cent of jobs, specifically occupations in transport, warehousing, metalworking, accounting, clerical and secretarial workers, among others, are at risk because of automation. Less affected are professions that require interpersonal skills, such as child care and education, health and nursing, social work, etc.[49] Industry 4.0 is changing our everyday working lives and many professions will soon be history. Historically, however, the eliminati-

on of old professions has made new ones possible. Some futurologists fear that this will no longer happen to the same extent, as part of the value chain will no longer be necessary at all. Stephan Dörner cites the key as an example in his online article "Does digitalisation threaten the end of every second job? If more and more people switch to smart homes and the smartphone is the key to all doors, then it will no longer be necessary to produce keys and the machines needed to make them.

2.3 Industry 4.0

The term Industry 4.0 refers to a future project with high-tech strategies and the associated fourth industrial revolution. The first industrial revolution was at the end of the 18th century. At that time, the focus was on operating production facilities using water and steam power. At the end of the 19th century, the second industrial revolution occurred. The use of electricity led to the division of labour in mass production on assembly lines. The transition to the third industrial revolution took place at the end of the 20th century. Production steps were automated through the use of electronic and information technologies. With the rapid and steady increase in software development, industrial/digital industrialisation was revolutionised. By networking plants, people and products, an almost self-organised production has developed. In this context, one speaks of Industry 4.0.[50]

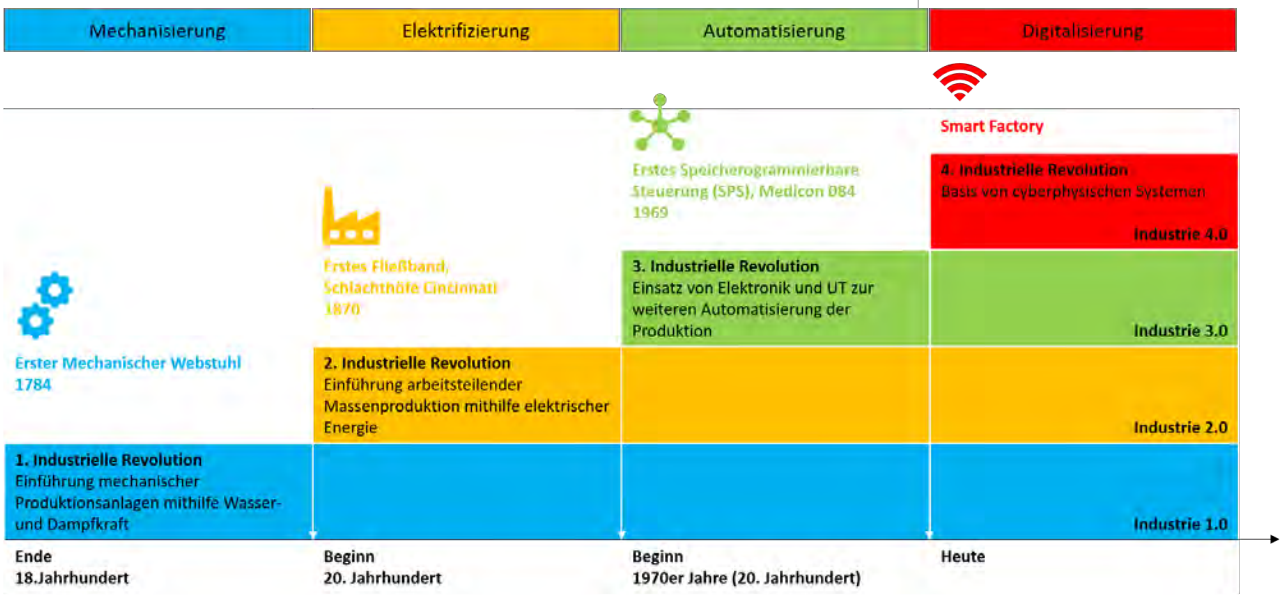
Industry 4.0 as the digitalisation of production

As mentioned at the beginning, networking within self-organised production represents the core of the fourth industrial revolution: Industry 4.0. These networked systems are able to react intelligently to each other through data and information exchange.

Even before self-control was possible, machines were controlled centrally. Data and information were collected by systems that did not interact with each other, evaluated by humans and used for specific purposes.

Today and in the future, machines will be equipped with sensors that allow them to communicate with each other and with external systems. Production, sales, development, delivery and end customers are networked and can react intelligently to each other.

For example, each machine knows the stock level. If products are running low, the system automatically sends an order to suppliers. Other machines, on the other



hand, plan production processes independently. For example, a car buyer can make a last-minute change to the new car he wants and the machines automatically plan a different production route. These machines act independently and intelligently.
In the smart factory, robots and machines do not merely carry out work steps millions of times over, but decide independently which option is the best. Logistics processes in a company are optimised to shorten production and supply chains.[51]

2.4 Work 4.0

With the further development in industry, work processes and jobs changed. Human labour is being replaced by automated workplaces such as robots and machines, and new business processes are emerging, for example in administration, sales or marketing. As a result, the need for highly qualified workers is increasing.

Movements such as "New Work" are concerned with what our work could look like in the future.

New Work

The term New Work comes from the English language and means "new work". The term was developed by the Austro-American social philosopher Frithjof Bergmann and describes the new way of working in today's society in the global and digital age. Bergmann starts from the assumption that the previous work system in which we operate is outdated. His New Work model is conceived as a counter-model to capitalism.
Society in the 21st century is in a transfer phase - a transition from an industrial to a knowledge society. This affects previous beliefs and shakes up established value systems. In addition, new demands are being placed on working models. Digitalisation is leading to flexibility in the world of work in terms of time, space and organisation, bringing with it new working spaces, structures and models.
New Work sees itself as a concept that names independence, freedom and participation as central values. This means that the development of one's own personality and free working are central. Learning goals and working hours are to be determined by the employees themselves, a democratic management culture is to be lived and agile decision-making processes are to be promoted. Flexible workplaces with home office options provide more freedom. In co-working spaces, people can benefit from each other. The old understanding of work is being replaced by a new individual concept. If more and more people work from home or share work spaces, this also has an impact on urban planning and its infrastructure.

2.5 Smart Cities

How people will live, work and reside in the future is difficult to predict. However, the United Nations predicts that almost 70 percent of the world's population will live in cities. By comparison, in the first decade of the 21st century, just over 50 percent of people live in urbanised habitats.[52] The greatest challenges for urban development are to ensure affordable housing, adaptation to climate change, sustainable mobility, digitalisation and a guarantee of sustainable energy supply.
Smart Cities means ideas and concepts for urban spaces that are made even more liveable through the use of the latest technology. Through data-based knowledge, such as knowledge about movement flows, energy consumption, utilisation of infrastructure and user behaviour, cities can become more predictable so that they can be better controlled and developed.

2.5.1 Urban development strategies

Smart technologies are intended to make everyday life in cities easier. Many of these technological developments are already known. It is possible to purchase electronic tickets for public transport or parking. Car, bike or scooter sharing makes it easy to get from A to B quickly in urban cities. Citizens of a municipality can process administrative procedures or petitions online. But these smart technologies were only the beginning. Work is already underway on predictive policing, intelligent mobility and other technologies.

Predictive Policing

Pre Crime Observation System, PRECOBS for short, is a forecasting software that can significantly support police work after burglary offences by calculating the probability of subsequent burglaries in a geographically limited area. According to studies, especially in the area of daytime residential burglary, it can be assumed that subsequent burglaries in the immediate vicinity are more likely to occur, the so-called near-repeats.[53] By means of anonymised information on past crimes and patterns of burglars, such as the time of the crime, the offence and the modus operandi, these forecasts can be made. These help the police to take preventive action against burglaries, for example by increasing patrols in the area.
This software was first used in L.A. (USA) in 2010, but European cities also implemented PRECOBS. In Germany, the Bavarian State Office of Criminal Investigation came to the conclusion that PRECOBS increases the chance of apprehending offenders and preventing subsequent offences by recognising near-repeats. This is especially true for travelling offenders/groups, as they often carry out several burglaries/offences in a geographically limited area. Although this software is an enrichment for police work and subsequent burglaries can be minimised - according to the software manufacturer by up to 80 percent of subsequent burglaries - it must be taken into account that errors can occur in the data evaluation. Questions of how to deal with personal rights must also be solved with regard to future technologies such as intelligent surveillance via facial recognition and behavioural recognition, among others [54]

Intelligent mobility

New technologies such as the smart switching of traffic lights should reduce long waiting times, traffic jams and the associated CO2 emissions. Video imaging and smartphones carried by drivers can be used to collect data and thus improve traffic management. [55]

Smart energy supply

Masdar City is an urban development project in the United Arab Emirates. The aim of the project is to build a zero-emissions city. The city is to be completely supplied by renewable energies. In addition, the city is to be almost waste-free through planned consistent recycling. The houses are built in such a way that they shade each other, which means that the temperature in Masdar City is 20 degrees Celsius lower than in the surrounding area. Rows of houses have been designed to act like air-suction corridors and to channel fresh air in a targeted manner. The city is scheduled for completion by 2030.[56]

2.5.2 Criticism of the smart development of cities

According to Rob Kitchen, smart city development does not sufficiently take into account the interests of individual city dwellers. Instead, the ideas of individual technology companies, property developers and political interests are implemented. Rob Kitchen sees here above all a commercialisation of public services.[57] This means, among other things, the privatisation of service companies for public services such as public transport.

Moreover, smart solutions may reproduce socio-economic inequalities. Although some smart cities aim for social mixing, high rents could lead to the exact opposite due to the elaborate technological solutions in the cities. Furthermore, more technological solutions also mean more data transfer - and how can data security be guaranteed in the process? Who owns the collected data?[58] In order to increase participation opportunities, democratic participation strategies must be an obligatory component in the planning of future smart city strategies, according to the smart city working group.

2.6 Smart Home

For 2021, the turnover of the smart home market in Austria is estimated at around 548 million euros. In comparison, this figure was only 226 million euros in 2017. According to Statista, annual sales growth of 12.6 % is expected in the coming years.[59] These expectations also apply to Germany and in Spain growth of 15.7 % is even expected. Smart living in the smart home will become standard for many in the future. Smart homes are becoming more and more attractive and are networking intelligent components, devices and systems with each other. Smart devices are becoming the smart home, regulating areas such as energy management, entertainment and communication, building and home security, health and wellness, as well as home automation and comfort within private living spaces and environments.[60] The aim is to optimise household processes by means of programmable information and communication technology. Digital assistance systems are intended to make everyday life easier and provide more independence. [61]

How does Smart Home work?

To explain how Smart Home works, it is necessary to introduce the term "Internet of Things". This term stands for information processing by sensors, processors, etc., which communicate with each other and control processes. The Internet of Things primarily aims at objects acting autonomously and supporting the everyday life of the people using them. In addition, two or more objects can be connected to each other within a closed local network, or via the internet or mobile radio. Whether light bulbs, window blinds, thermostats or other objects: In a smart home, they all have access to the network and can communicate with each other.

The smart home is thus an application area of the Internet of Things. The individual components can be monitored and controlled via end devices such as smartphones or tablets.[62]

In general, there are three main aspects to consider. The devices must be compatible and the associated control system must be able to network with the products. A stable internet connection is indispensable. The control system is usually installed in an app on the smartphone. Automations such as sensors recognise environmental stimuli and can thus notify the user.

An example of this: A smoke detector reports a fire due to smoke (environmental stimulus). The smoke detector has been programmed to automatically switch on the lighting to indicate the escape route. At the same time, it sends a notification to the smartphone and gives the indication of a fire..

What can be controlled?

Although smart home developments are still in their infancy, almost all electrical devices can already be integrated into the home automation system. No matter whether it's coffee machines, fans, washing machines or the front door. With intelligent WLAN sockets or SwitchBots button pushers, devices that are not yet Smart Home-capable can be converted.

Energy management:

- Heating controller
- Shading (roller shutters that adjust according to the position of the sun)

Entertainment and communication:

- Light variations
- Smart TV as a control centre
- Call up videos, pictures, music on the TV
- Retrieving mails via TV

Building and housing safety:

- Security camera (with cloud storage)
- Switching of lamps as part of safety prevention
- Electronic door locks
- Motion detector
- Door and window contact
- Roller shutters

Health and Wellness:

- Air quality monitoring (humidity, air pressure, ...)
- Networked body scales (incl. measurement of body fat and water percentage, muscle and bone mass)
- Sleep tracker

Home automation and comfort

- Operation of individual household appliances such as oven, washing machine, etc. via app
- Air monitoring
- Indoor climate monitoring
- Robot lawnmower
- Robot vacuum cleaner

Dangers of home automation

Every technology also harbours dangers. Nowadays, it seems less impossible that the smart home can also turn against its user or be manipulated from the outside. It is a great tool for closing tilted windows from work, but it is even more dangerous if data can be intercepted and movement profiles can be created that show when the home is empty. Attackers could also freeze water pipes, shut down heating systems or fill up bathtubs by manipulating the systems. It is also conceivable that the system itself is faulty and executes arbitrary commands. [63]

In Germany, for example, there was a case where Alexa, a voice assistant from Amazon, switched on and played very loud music. The occupant of the flat was not at home at the time and since the loud music did not stop, the neighbours called the police. The police gained access to the flat as no one responded to the police's order. The whole operation cost the resident 3,500 euros. [64]

3. E-learning

The demands and processes of the labour market are constantly changing. It is up to the learners to face these challenges and to participate in lifelong learning as part of the knowledge and information society. The Internet offers good conditions for this in the broad field of e-learning offers to enable self-directed learning. E-learning offers provide an extensive collection of knowledge, thus paving the way for permanent vocational education and training and meeting the needs of the knowledge society. In order to be able to survive in the labour market until retirement, actors in the labour market cannot avoid taking part in further training even after their initial training due to the rapid change in technologies. With e-learning programmes, companies in particular hoped to keep the costs of continuing education low and to provide ideal conditions for this.[65] E-learning programmes include all learning offers that use different types of media and their aids (PC, telecommunications, etc.) to create a learning environment that gives learners enough incentive to participate in the learning offer. In addition to the learners' own initiative and discipline, "conscious planning as well as control and regulation of learning behaviour" is part of these learning environments.[66]

E-learning		
He/She understands and knows the most important forms of e-learning, including advantages and disadvantages..		
Knowledge	**Skills**	**Competence**
He/She • understands that e-learning is an integral part of the global education and training landscape. • understands that e-learning offers are an additional possibility for education and training and have advantages as well as disadvantages • understands that there are many relevant offers in the field of e-learning at national and European level	He/She can • recognise different e-learning formats and assign them to learning situations. • name advantages and disadvantages of e-learning. • find relevant e-learning offers at national and European level on the basis of the Internet.	He/She is able to • evaluate advantages and disadvantages of e-learning and select formats accordingly. • use relevant e-learning offers at national and European level for him/herself.

3.1 E-learning offerings and their history

Learning machines, in a sense the predecessors of today's e-learning, were already being tinkered with long before the internet age. As early as 1588, Agostino Ramelli constructed a book wheel, a kind of reading machine, and in 1866 Halcyon Skinner constructed a machine to consolidate spelling skills. Other learning machines followed and as early as 1964, teaching machines were constructed in Germany in which up to 64 learners could participate and different learning levels could be selected.
In the 1970s, computer-based learning programmes followed, TICCCIT (Time-shared, Interactive, Computer-Controlled Information Television) and PLATO (Programmed Logic for Automated Teaching Operations), which were developed in the USA by the NSF (National Science Foundation).
Computer-based learning programmes can be thought of as a medium in book form. Just like in a book, there is a table of contents - a red thread - through which learners are guided through the material to be learned. At the beginning of the 1980s and 1990s, these learning programmes were called "Drill & Practice programmes". These learning programmes were mainly used to instruct employees in safety matters or to secure implicit knowledge. [67]
As the experiment of "computer-based learning" seemed to be successful, there was further development of these concepts in the area of vocational education and training and in schools. In vocational education and training, interactive learning videos were already used in 1978. In Germany in 1986, work was done for the first time in Europe on a computer-supported learning programme TOAM for the subject area of mathematics at all schools. Since the 1990s, it has become apparent how forward-looking those projects were. E-learning is a fixed component of the global education and training sector..

3.1.1. What is e-learning?

E-learning is synonymous with all learning opportunities that are possible due to new media such as digital learning platforms, learning content provided in multimedia form, etc. and can be seen as an extension of traditional forms of learning. Those who use these learning offers are no longer dependent on location- and time-bound education and training offers.

According to Baumgartner, e-learning in 2002 is a "Collective term for IT-supported learning or all forms of electronically supported learning. It includes network and satellite-based learning, learning via interactive TV, CD-ROM, videotapes, etc. More and more, however, the term is used exclusively for Internet- or Intranet-based learning“ [68]

But already in 2009, the definition no longer seems so clear. At a conference of the Society for Media in Science (GMW), there was even a discussion about abolishing this term. The question was examined as to what all can be seen under the term e-learning. For example, are documents that are made available by lecturers via website,

e-mail, etc. already e-learning? The media scientist Peter Baumgartner explored this question in 2012 in his article in Zeitschrift für E-Learning (Journal for E-Learning) and came to the conclusion that the term e-learning cannot be replaced by a better one for the time being. [69]

According to Michael Kerres (2012), e-learning is "all forms of learning that use electronic or digital media for the presentation and distribution of learning materials and/or to support interpersonal communication". [70]

2014 Hermann-Ruess and Ott understand e-learning as: "teaching by means of various electronic media. These can be, for example, apps, electronic learning games, learning software on DVD or CD, You-Tube universities, blogs, wikis, blended learning or online courses." [71]

22020, the term e-learning is still very broad. Thus, all digital media that support teaching and learning and are used for this purpose are understood under this term. These offers can be used online as well as offline via PC, laptop or smartphone. Digital content can be online PDFs or e-books, videos, virtual classrooms, video conferences, web-based programmes, freely available online courses (MOOCs, Massive Open Online Courses) as well as learning platforms and learning management systems (LMS), among others.[72]

3.2 E-learning formats

3.2.1 Webinars, Web Seminars

Webinars are online seminars, i.e. web seminars. But beware: The term webinar is a registered word mark which was registered with the German Patent and Trade Mark Office (DPMA) in 2003 and whose trade mark protection runs until March 2023.[73]
Web seminars require software-based technology to communicate with participants and provide videos and audio files. This technology makes it possible to reach a company's customers, private individuals, etc. worldwide. In the literature, this is referred to as the one-to-many principle, where one speaker speaks to many listeners. The information is presented via screen sharing and the listeners follow the lecture via telephone or internet telephony. In addition, there is also many-to-many communication, which involves the participation of everyone in the web seminar. From this it can be deduced that the term webinar or web seminar includes two meanings, namely online presentation and online training. These trainings can take place live and synchronously, or recorded, i.e. asynchronously.
In a synchronous web seminar, participants register online and receive a link with which they log in and participate at the appropriate time. The extent to which interactivity (questions, input from participants, etc.) is allowed is up to the instructor. Whether files can be downloaded or evaluations take place depends on the software. The selection of suitable software always depends on the requirements placed on a seminar. Basically, a distinction can be made between freely available versions and versions that are bound by collective agreements. Accordingly, the contents of the software vary..

The following criteria should be considered in this regard:

- Is this a live web seminar or a recording?
- How long does the web seminar last?
- Is a recording function required and is the video offered later as video on demand?
- For how many participants is the web seminar planned?
- Are features such as whiteboards, virtual backgrounds, screen sharing, live chats, livestream via YouTube or Facebook needed?
- Are participants allowed to ask questions and if so, in what format? Maybe there is a moderator who answers questions in the chat during the web seminar?

Web seminar software (selection)

Last update: February 2021

Zoom

The following functions are offered free of charge in the basic version:

- Two-person meeting of unlimited duration
- Live and recorded conferences possible
- Chat function
- Up to 100 participantsr

Skype

Up to 50 people free of charge, incl. live webinar and recorded webinar possible, chat function, screen broadcast, live subtitles, available on all devices, unlimited number and duration of meetings.

GoToMeeting

Costs from €11.75 per month, 1 up to 250 participants, unlimited duration and number of meetings, live webinar and recorded possible, chat function, virtual whiteboard, drawing tools, personal meeting room

Mikogo

Costs between 12 and 45€ per month, unlimited duration and number of meetings, live webinar and recorded possible, chat function, handover of the host position to a participant during the webinar, interactive whiteboard, integrated file transferr

Edudip

Costs between 34 and 140€ per month. Classic webinar software, number of participants limited to 30, 100, 500 or more depending on tariff. No app installation necessary, participation possible via browser (browser-based). Chat function, screensharing, survey tool, direct sharing of YouTube videos and much more..

3.2.2 Web-based-learning/Web-based-training

Web-based training (WBT) refers to complete courses or learning units that are offered via the Internet or an intranet. Complete courses or learning units offered via CD-ROM or DVD are referred to as Computer Based Training (CBT). WBT formats are particularly popular in continuing vocational training. This format enables location- and time-independent as well as individual learning. Knowledge can be tested by means of computer-based tests. This is done by means of special programmes.[74] In addition, WBTs can also be moderated by an instructor, the so-called mWBTs, and functions such as e-mail, news, chats, material archives and discussion forums can be linked to the WBT. Audios and videos can be streamed live and distributed. This enables better networking of learners and teachers than in traditional distance learning.[75] Gruttmann depicts this networking of forms of interaction by means of a triangle, the 3K model, at the corners of which are the 3Ks, for communication, coordination and cooperation, and in the middle of the triangle are terms such as: Chat, messenger, email, wiki, whiteboard, forum, tagging, document management, web conferencing, web-based calendar, etc. The 3K model is intended to depict the classification of web-based services.[76] According to this, numerous technologies are needed to successfully implement a WBT. Above all, platforms, which are differentiated according to authoring systems, learning content management systems and learning management systems, are irreplaceable for WBTs.[77]

Author systems
With these programmes, content such as animations, didactically prepared learning content, representations of media content can be designed and implemented in WBTs. This is possible without any programming knowledge.

Learning Management Systems
Learning Management Systems (LMS) are learning platforms. Learning content can be exchanged and also enables communication between learners and teachers. So-called LMSs are Moodle, Chamilo or Blackboard Academic Suite

Learning Content Management Systems
Learning Content Management Systems (LCMS) offer even more functions than LMS, such as managing content and learning content, creating author directories, editing possibilities, managing reusable learning objects, and more

In principle, WBT can be offered in various forms of interaction. For example, as a supplement to face-to-face training by only downloading teaching materials, or as interaction between teachers and learners, or only learners among themselves via the Internet (synchronous and asynchronous), and so on.[78] But also social media portals such as Facebook and instant messaging services can strictly speaking be described as web-based learning. Learners learn on their own initiative in closed user groups, discuss open questions and make use of cloud services to exchange learning materials, etc[79].

3.2.3 Wikis

Wiki means "fast" and is a short word from the Hawaiian word "wikiwiki". Wikis are websites that represent a special form of knowledge transfer because they are designed in such a way that users can read as well as edit, expand, etc. content. Wikis make it possible to reset changed contributions due to an integrated version management. Divergent versions of an article can be detected due to a special view in which both wiki articles are highlighted by line. However, the contents linked by means of cross-references are innovative. Differentiated user roles do not exist in wikis. They do not function according to the principle of conventional content management systems. Wikis are often used in companies to promote the transfer of know-how. The idea goes back to Tim Berners-Lee. The first wiki was developed by Ward-Cunningsham in 1995.

The largest and best-known wiki is "Wikipedia". It is based on the open-source wiki software MediaWiki. MediaWiki can run on its own server computer or be used as a service. Although numerous wiki engines are used, only a few have cross-references, which are the real heart of wikis.[80] By the end of 2020, Wikipedia had delivered around 55.6 million articles in over 294 languages.

3.2.4 Blended Learning

Blended learning refers to the combination of face-to-face and online teaching. These two teaching phases alternate with each other and can be regarded as equivalent components of a course. The content-related focus of blended learning is on interactivity, also in face-to-face teaching, through group exercises, discussions among each other, etc. The online phases are intended to be interactive through inputs and assignments. The online phases should be well structured with inputs and tasks that enable learners to apply what they have learned. Blended learning is thus a very active form of learning and tries to maintain the triangular relationship with the peers, the teachers and the learning content.[81] Learning content and the exchange between learners and teachers in online lessons is ensured by digital learning platforms, learning management systems and the like.[82]

3.2.5 Serious Games

Digital learning games (also called "serious games" or "educational games") take place in a hardware- and software-based virtual environment and are intended to stimulate learning. In contrast to computer-based games, they pursue a clearly defined learning goal. Serious games are didactically prepared and enable the measurability of learning successes.[83] Digital learning games are typically used in the field of education. In addition to serious games or educational games, the term **digital game-based learning** has also become established since 2000. These games are intended to be both fun and to impart knowledge. They can be categorised according to certain types of games (puzzle games, simulations, action, adventure, plan and role-playing games, quizzes and web quests), which are played in a wide variety of forms (e.g. MMOGs - massively multiplayer online games). The outcome of the game can be open-ended, linking reality and online play, as well as games that respond to players' gestures, LAN parties and e-sports events.[84]

Digital learning games can be designed for the acquisition of the following competences:

- Cognitive skills - logical, strategic forward, solution-oriented thinking, concentration, memory, spatial imagination, action planning, ...
    - Genius - At the centre of power (a strategy game - political decisions have to be made)
    - The Sims (strategy game, life situations are simulated)
- Social skills - teamwork, cooperation, communication, competition, empathy, interaction, ...
    - "Let's team!" is a serious game designed and developed by the DeustoTech Learning research group. It is designed as a complementary resource for developing and evaluating teamwork, to be used as part of a personal training plan, rather than as a game for independent players or learners.

    - Peacemaker (The conflict between the Israelis and the Palestinians is addressed, the aim is to create peace - empathy and conflict resolution is required)
- personality-related competences - frustration threshold, self-confidence, self-control, stress management, ...
    - Flight simulator (several tasks must be completed accurately during the flight)
- Media skills - media studies, media design, software skills, ...
    - MovieStorm (Technical skills such as video editing, voice recording and audio recording are played through, creativity and media skills are promoted.
- Sensorimotor skills - reaction, dexterity, hand-eye coordination, movement, ...
    - Wii Sports (a game console with motion sensors for e.g. sports simulations)
    - Cincinnati (movement-intensive interactive video game which, according to an Australian-English research group, has a positive effect on the vascular system and encourages children to exercise more)

In 2007, a study was published in a hospital in Boston, according to which surgeons who regularly played video games were 27 per cent faster during surgical procedures and made 38 per cent fewer mistakes than those who did not play video. A study in Italy came to a similar conclusion, comparing 42 medical graduates, Wii gamers and non-gamers.
Especially to promote the rehabilitation of eye-hand coordination after accidents, there are numerous computer-assisted games, such as synchronisation test UP-DA-SHIF, coordination test HECOOR, among others.

Tipp
Unter diesem Link können zahlreiche weiterführende Links zu diesem Thema aufgerufen werden:
http://archive.e-learningcentre.co.uk/eclipse/Resources/games.htm#d2000

3.3 Positive and negative aspects of e-learning

3.3.1 Positive aspects of e-learning

- **Location independence** - With a given internet connection, the e-learning material can be accessed and learnt at any location.
- **Independence in time** - No matter whether it is 6 a.m. or 11 p.m., learning can take place around the clock. Exceptions to this are online events which require personal participation and are not archived (e.g. virtual classroom).
- **Offers for different types of learners** - By providing different learning offers (video, texts, audio examples, etc.), different learning types can be addressed and evoke a better learning result.
- **Adaptation of the learning pace to individual needs** - Learners can choose their own learning pace and do not have to adapt to the pace of the group, as in a class. Texts can be read several times, breaks can be set individually.
- **Self-directed learning** - Access to knowledge is becoming easier and easier. This has a positive impact on learning behaviour and especially on motivation. However, learners need skills to deal with this flood of information in order to decode and evaluate it.
- **Optimisation of the teaching materials** - The content and design of materials provided can be better prepared for learners and a wide variety of media can be used. Existing materials can be improved and reused.
- **Learning together is possible** - Learners can exchange ideas in group forums, MS teams, wikis, etc. In this learning constellation, one speaks of cooperative learning environments.
- **Archived courses and documents** - Learners can access documents permanently - even after the end of the course. Teachers can better evaluate course processes and outcomes and ensure course improvement.
- **Optimisation of course administration** - On learning platforms such as Moodle, MOOCs or messenger services with advanced features such as MS Teams, announcements can be made and other tools can be offered (course calendar, grade, test tool, etc.).
- **Ongoing updates** - Up-to-date content can be provided at any time.
- **In some cases a great cost saving for learners** - Courses that take place far away from one's own place of residence and would result in one or more overnight stays can be saved through e-learning offers.
- Free e-learning offers are also made available (MOOCs, OER).

- **Cost saving for teachers/providers of e-learning offers** - Learning content can be produced and offered with little financial effort
- **Anonymous participation** - Learners can learn anonymously and do not have to face the pressure of a group.

3.3.2 Negative aspects of e-learning

- **Internet access must be available** - Not all people have access to the internet. (E.G.: In Austria, only about 70 % of all households have internet access).
- **Additional work for teachers** - Teaching materials need to be expanded and adapted.
- **Knowledge exchange between learners and teachers more difficult** - Some questions sometimes remain unanswered, can only be asked or answered later. Secondary issues are usually not mentioned and / or dealt with.
- **Loss of human relationships** - Personal contact between teachers and learners is decreasing. It is difficult for the trainer to capture the moods of the participants.
- **High level of self-motivation required** - Lack of motivation due to group dynamics or comparisons with other learners.
- **Change of learning experiences and/or learning habits** - Learning content must be acquired through self-study. Questions to the teacher can only be asked at certain times and will be answered either immediately or delayed.
- **Negative health effects of online learning** - Faster eye fatigue, posture problems, digital stress, etc.
- **Lack of IT skills** - Teachers and learners do not always have the necessary competences.
- **Copyright issues** - Learning materials such as audio examples, learning videos, etc. are subject to copyright. However, learning materials created and lectures given by teachers may not be shared on the internet either.
- **Not always cheaper than traditional training** - Additional costs for technical equipment
- **Disturbing factors in learning** - In contrast to the classroom, disruptive factors such as telephone, etc. are more frequent.
- **Inexperienced trainers** - Teachers come from the classroom and do not always have the right methods in online teaching.
- **Practical parts practically impossible** - Especially courses that require very practical instruction, such as cooking courses, chemistry courses, etc., cannot take place exclusively via distance learning.

3.4 Where are which e-learning formats offered?

E-learning formats are offered for formal and informal training. In companies, when e-learning formats emerged, learning videos were made available to employees for information purposes. For example, learning videos on the topic of "occupational safety". Wikis are used in companies to promote the exchange of knowledge transfer. At universities, e-learning was seen more as a means of distribution in order to get learning content to students more quickly and on a larger scale. In the meantime, not only due to the Corona crisis, online courses in distance learning (Distance Learning University of Hagen) and the implementation of learning management systems such as Moodle have become an integral part of teaching. In schools, e-learning formats are replacing face-to-face teaching due to the Corona Crisis 2020. Adult education institutes are also taking advantage of these formats and using them not only in open courses, but also internally in the context of further training for trainers. Zoom webinars, MS teams and Moodle play a central role here.

3.4.1 Best practice "e-learning" using the example of the Leopold Franzens University

From 2005 to 2012, a project for the promotion of media and e-learning was implemented at the Leopold-Franzens University and the purchase of materials for e-learning was financially supported.[85]
The project focused primarily on adapting teaching through e-learning and new media to the situation of the students, interdisciplinary research, teaching and learning, implementation of new learning technologies, creation of common learning platforms and an additional offer of distance learning.[86]

The e-learning/e-teaching strategy is based on the model of the University of Basel[87] and distinguishes between the following three concepts:

- **Enrichment concept**: Classroom teaching supported by electronic scripts, internet sources, interactive exercises, etc., although this offer is optional.
- **Integrative concept**: In this concept, the e-learning part takes on a more important role and is in no way inferior to face-to-face teaching in terms of quality. The tasks are coordinated with each other.
- **Virtual teaching concept**: Teaching takes place exclusively virtually.

Although the University of Innsbruck has developed very well in the field of e-learning through the project and there are many reasons for establishing one, there is still no distance learning programme, but only individual online courses. Above all, the additional work involved in the conception of distance learning/online teaching is a problem and communicated by the university as follows:
"The commitment and idealism of the teachers are appreciated and the University of Innsbruck strives to create incentives. These range from monetary performance incentives for the implementation of blended learning in courses to a wide range of supported infrastructure (learning platform, audio-video studio, etc.). The issue of additional effort is currently being addressed, but comprehensive results have not yet been

achieved. Approaches to solutions and incentive systems are still being sought."[88]
Until 2020, the Leopold Franzens University was the leader in the field of e-learning and also the contact for schools in matters of e-learning. However, online teaching was really pushed forward by the Corona crisis in 2020, which forced all universities to switch to distance learning and catch up with the University of Innsbruck.
Information on the project and the e-leaning offers at the Leopold Franzens University can be found at: http://eLearning.uibk.ac.at/

3.4.2 New didactic approaches to implementing e-learning

According to Baumgartner, teachers who want to implement e-learning in the classroom should follow the 3-approach model. According to this, the first step is to familiarise oneself with the virtual learning environment by making digital learning content available to learners online. The next step is to integrate asynchronous learning settings. These can be chat forums, which promote the discussion of additional topics. The third stage can be a complete switch to e-learning. [89]
Gilly Salmon describes active online learning and teaching as a multi-stage process. The model describes the requirements for learners and teachers.

- **Level 1:** Access and motivation - Teachers should encourage learners to set up the system to create access.
- **Level 2:** Online Socialisation - Initially, introductory exercises are designed to introduce people to sending and receiving contributions and to overcome social and cultural barriers.
- **Level 3**: Information sharing - through the use of individualised software, tasks are made easier and learning material can be used.
- **Level 4:** Knowledge construction - processes to discuss online are enabled.
- **Level 5:** Development - Inclusion of information outside the closed forums through targeted interventions. [90]

3.4.3 Quality development of e-learning

Since the 1990s there has been a discourse on which quality criteria should determine e-learning. According to Euler, the quality criteria must be defined from a pedagogical, educational organisational, educational policy and economic perspective. In research, e-learning is usually compared in terms of effectiveness, which, however, turned out to be too complex and, with regard to learning success, the teaching method including didactic implementation is decisive. Consequently, the learning medium is not exclusively responsible for learning success, but also depends on the learning process and the learners. In his analysis "Quality Development in E-Learning: Basics, Learning Orientation and Necessary Competences", Ulf-Daniel Ehlers goes into the individual possibilities of quality development in e-learning. For this process of quality development is of great importance overall, just as it is in initial and continuing education. This is clearly visible in the emergence of quality seals (DIN PAS 1032-1, Quality Mark of the British Learning Association, Quality Seal E- Learning Uni Darmstadt, Quality Seal E-Learning Uni Duisburg-Essen) in this field.[91]

3.5 Conclusion

E-learning is gaining more and more importance and has become an indispensable part of everyday learning in the 21st century. Particularly with regard to the Bologna Process, which initiated the comparability of teaching, e-learning is a means of flexibly adapting teaching offers and overcoming mobility barriers. The digitisation of education has already been initiated at the national level of the EU countries and within the European Union. In Austria, for example, data from the education sector of every person has been collected and stored since 2002 with the introduction of the Education Documentation Act. These data, which are stored for around 60 years, include: School success, grades, participation in school skiing courses and other personalised information such as the national insurance number.[92] At the EU level, digital passports such as the Europass will provide information on education and training in the future. Due to the Corona crisis, the European Commission published an online portal with learning materials in March 2020 to support and push distance learning during this period.[93]

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