



SIDT SOCIAL INNOVATION & DIGITAL TRANSFORMATION Unit 6 – Digital Economy & Business Models

Prof. Dr. Britta M. Gossel

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Schedule

- 1. Introduction to digital business
 - 1. Information technology as prerequisite
 - 2. Evolution of computer power
 - 3. Power of digitalisation
 - 4. Increase in networking
 - 5. Growth in amount of data
- 2. Groundwork in digital economics
 - 1. Information competition
 - 2. Platforms of the digital economy
 - 3. Business models of the digital economy
- 3. App Economy





1.1 Information technology as a prerequisite for the digital business (Kollmann, 2020, p.4)

- Since the beginning of the 1990s, innovative information technology has induced a structural change in society and the economy.
 - Before: Computers and networks were reserved for specialists.
 - Now: Part of everyday life
- Steady progress and the growing importance of information technology are necessary preconditions for a new dimension of economic interaction: electronic commerce on electronic data channels.

So which developments in the technical framework play a special role for the digital economy?





1.2 The evolution of computing power (Kollmann, 2020, p.4).

Beginnings:

- Simple addition (= several hours of computing time).
- Footprint of a warehouse
- Acquisition costs in the seven-digit range

Following development:

- exponentially increasing computing power
- rapidly falling hardware prices
- Miniaturisation of hardware

\rightarrow Check again Unit 01 – Basics in Computer Sciences





The power of digitalisation (Kollmann, 2020, p.6-7)

- The digitisation of information in the software sector is a basic prerequisite for the Digital Economy.
- Digitisation makes it possible to process, copy, transmit and display large amounts of data of text, images and other information without loss of quality and at high speed.

Basic types of data:

- Text: ASCII code (American Standard Code for Information Interchange (e.g. 1000001 = "A").
- Image: Decomposition into rows and columns Elements of a matrix (pixel: 16/32-digit sequence of digits) Row of digits
- Sound: analogue-digital converter digital data stream







http://www.thematrixer.com/binary.php





1.3 The power of digitalisation (Kollmann, 2020, p.6-7)

Technology dimension

- The amount of data created is enormous:
 - Image e.g. 830 KB (ITU-R BT 601 international standard for professional digital video).
 - 1 min video e.g. 1.26 GB

Data storage capacities

- Capacity of a CD-ROM: 800 MB (=30 sec video)
- Capacity of DVD: 4.7 GB
- Capacity of USB stick: 64-128 GB

→ Reduction of storage requirements through data compression





1.3 The power of digitalisation (Richter, 2010)

One good example to illustrate:

The Library of Congress in Washington D.C. is considered the largest library in the world with around 30,000,000 books. Now let's assume that an average book has 200 pages of 1,200 characters each.

1 Byte	= 8 Bit	one letter
1kB	= 1.000 Byte	one book page of text
1MB	= 1.000 kB	image/ MP3 file 3-4 MB, bible as text 5 MB
1GB	= 1.000 MB	movie in DVD 5 GB
1TB	= 1.000 GB	Library of Congress 7.5 TB
		Database with a dataset of all humans (à 1kb) 7TB





1.3 The power of digitalisation (Kollmann, 2020, p.8)

Economic dimension

- Electronic capture, processing and sharing of 0/1 data bring significant economies of scale and cost.
- For information products, the initial creation of the digital content is associated with greater costs (= **first copy costs**).
- The subsequent copying and dissemination of the 0/1 data is then only associated with marginal costs (e.g. for storage or data transmission).
- As the number of copies increases, there are considerable cost degression effects that lead to an increase in the economic attractiveness of the use of digital information and its distribution.





1.3 The power of digitalisation (Kollmann, 2020, p.8) **Economic dimension**



Abb. 1 Kostendegressionseffekte bei der Distribution digitaler Informationen. (Quelle: Wirtz 2013, S. 187)





1.4 Increase in networking (Kollmann, 2020, p.9)

- Networking of computer systems allows new degrees of freedom in electronic communication.
- Information revolution: Worldwide networking of digital data and information paths new phase of upswing with new rules.
 - Forms of communication change
 - Market boundaries dissolve,
 - Globalisation is advancing
 - Individual information can be transmitted without spatial restrictions.





1.4 Increase in networking (Kollmann, 2020, p.9)



Abb. 2 Die Penetration von Computer und Internet zum Massenmedium. (Quelle: in Anlehnung an Pagé und Ehring 2001, S. 93 und Erweiterung durch Daten von *statista.com* zu Internet- und Computernutzern (2001–2015))





- 1.4 Increase in networking (Kollmann, 2020, p.9)
- Worldwide data network as the most important information and entertainment medium.
- Use of the infrastructure determined by availability, speed and costs.

economy

- Availability: "always online" access routes such as telephone network, cable long-distance network, direct fibre optic connection, electricity network, satellite access, terrestrial radio technology (mobile phone network), long-term evolution technology (LTE)
 Speed: high convenience, wide design variety, competitive
- Costs: expensive time- or volume-based tariffs flat rate





- **1.5 Growth in the amount of data** (Kollmann, 2020, p.11)
- The information units transmitted with bits & bytes and thus the actual contents of the data exchange are increasingly becoming the carriers of economic transactions.
- Business processes are increasingly being shifted from the personal level (face-toface) to the channels of global data networks (bit-to-byte).
- **Information volume** of unimaginable dimensions:
 - As much data was produced in 2000-2002 as in the 2000 years before.
 - From 2003-2006, the worldwide data volume quadrupled.

"Big Data" = consolidation of large amounts of data and their evaluation.





- **1.5 Growth in the amount of data** (Kollmann, 2020, p.13)
- Against this background, the central characteristic of the post-industrial computer society is the systematic use, appropriation and application of information, which complements labour and capital as the exclusive source of value/production/ and profit.
- Information-processing industry becomes an economic sector in its own right.
- Information as a factor of production.
- Shift of traditional economic sectors observable; new markets, new business models, new business fields and new ventures emerge.





1.5 Growth in the amount of data (Kollmann, 2020, p.13)



Abb. 4 Der Wirtschaftssektor "Information". (Quelle: in Anlehnung an Nefiodow 1990, S. 27)





2.1 Information competition as a result for the Digital Economy (Kollmann, 2020, p.22)

Network economy/ information economy/ digital economy: economic dimensions of information use and thus information competition, electronic business processes on digital data paths with the following special features:

- Product offer: products and services can be offered or sold virtually via information technologies (internet/ mobile telephony/ITV) around the clock, seven days a week and all year round.
- Information offer: Digital information on the products, services and the company can be presented easily, quickly and comprehensively with the help of multimedia modules and under the conditions of virtual contact.
- Information demand: The customer interested in the products, services or companies can access the required information more easily, quickly, comprehensively and, in particular, actively due to interactive communication options.





2.1 Information competition as a result for the Digital Economy (Kollmann, 2020, p.22)

Network economy/ information economy/ digital economy: economic dimensions of information use and thus information competition, electronic business processes on digital data paths with the following special features:

• ...

- Information exchange: Contact with the customer interested in the products, services or company can be made more direct and individual.
- Information processing: With the help of electronic information processing, companies have the possibility to process an enormous amount of relevant customer and process data more easily, quickly and comprehensively and to incorporate the results directly into the customer contact.





2.1 Information competition as a result for the Digital Economy (Kollmann, 2020, p.22)

The associated economic opportunities are also referred to in this context as "digital business":

- Theoretical view: Digital business is the use of information technologies for the preparation (information phase), negotiation (communication phase) and execution (transaction phase) of business processes between economic partners via innovative communication networks.
- Practice-oriented view: Digital business is the use of innovative information technologies to sell something via virtual contact, to offer or exchange information, to provide the customer with comprehensive support and to enable individual contact with market participants.





2.2 Platforms of the Digital Economy (Kollmann 2020, p.23)

As a basis for the handling of electronic business processes, three central platforms have formed in practice, which have the exchange of all three building blocks (information, communication and transaction) as their content and are thus counted among the narrower circle of e-business.

Associated thrusts Purchasing, Sales, Trade, Contact, Communication

- **E-procurement** enables the electronic purchase of products or services by a company.
- An e-shop enables the electronic sale of products or services by a company via digital networks.
- An e-marketplace enables the electronic trading of products or services via digital networks.
- An e-community enables electronic contact between persons or institutions via digital networks.
- An **e-company** enables electronic cooperation between companies via digital networks.





2.2 Platforms of the Digital Economy (Kollmann 2020, p.25)



Abb. 1 Die elektronischen Geschäftsbereiche in der Digitalen Wirtschaft. (Quelle: in Anlehnung an Merz 2002, S. 24)





2.3 Business Models of the Digital Economy (Kollmann 2020, p.26-27)

How can revenues be generated in digital business?

An electronic business concept describes the exchange of an offered performance (product or service) between certain business partners with regard to the content and the remuneration that comes into play for it.

Five typical business concepts:

- Content
- Commerce
- Context
- Connection
- Communication





2.3 Business Models of the Digital Economy (Kollmann 2020, p.27)

Content

Collection, selection, systematisation, compilation (packing) and provision of content on a dedicated platform within a network.

Simple, convenient, visually appealing and online accessible presentation and handling of content for the user.

Revenues:

- Direct revenue models (e.g. premium content e.g. spiegel.de/ Spiegel+).
- Indirect revenue models (e.g. advertising during content presentations e.g. manager-magazin.de)





2.3 Business Models of the Digital Economy (Kollmann 2020, p.27)

Commerce

Initiation, negotiation or settlement of business transactions via networks. Traditional transaction phases are electronically supported, supplemented or substituted.

Simple, fast and convenient handling of buying/selling processes.

Revenues:

- Direct revenue models (e.g. sale of products and services).
- Indirect revenue models (e.g. advertising e.g. expedia.de)





2.3 Business Models of the Digital Economy (Kollmann 2020, p.27)

Context

Classification, systematisation and consolidation of available information and services in networks.

Goal: Improvement of market transparency (complexity reduction) and orientation (navigation).

Revenues:

- Direct revenue model (e.g. fee for inclusion or placement of content).
- Indirect revenue model (e.g. advertising, statistics, content).

Examples: Search engines (e.g. google) or web catalogues (e.g. web.de).





2.3 Business Models of the Digital Economy (Kollmann 2020, p.27)

Connection

Interaction of actors in data networks enabled or organised. Connection on a commercial or technological level.

Revenues

- Direct revenue models (e.g. object registration/connection or connection fees)
- Indirect revenue models (e.g. advertising, statistics, cross-selling)

Examples

- Technological consolidation: T-online.de
- Commercial consolidation: autoscout24.de





2.3 Business Models of the Digital Economy (Kollmann 2020, p.27)

Communication

Enables or supports interaction between actors in networks. Communication between users of a site; communication of users with a platform.

Revenues

- Direct model (e.g. connection fee)
- Indirect model (e.g. advertising)

Examples: facebook.com; elitepartner.de





2.3 Business Models of the Digital Economy (Kollmann 2020, p.27)

	Content	Commerce	Context	Connection	Communication
Definition	Sammlung, Selektion, Systematisierung, Kompi- lierung und Bereitstellung von Inhalten über Netzwerke	Anbahnung, Aushandlung und/oder Abwicklung von Geschäftstransaktionen über Netzwerke	Klassifikation, Systematisierung und Zusammenführung verfügbarer Infor- mationen in Netzwerken	Repräsentation des Grades der formalen Verknüpfungen in Netzwerken	Herstellung der Möglichkeit eines Informations- austausches in Netzwerken
Ziel	Bereitstellung von konsumentenorientierten, personalisierten Inhalten über Netzwerke	Ergänzung bzw. Sub- stitution traditioneller Transaktionsphasen über Netzwerke	Komplexitätsreduktion und Bereitstellung von Navigationshilfen und Matchingfunktionen über Netzwerke	Schaffung von technologischen oder kommerziellen Verbindungen in Netzwerken	Schaffung von kommunikativen Verbindungen in Netzwerken
Erlösmodell	Direkte (Premiuminhalte) und indirekte Erlösmodelle (Werbung)	Transaktionsabhängige, direkte und indirekte Erlösmodelle (Werbung)	Direkte (Inhalts- aufnahme) und indirekte Erlösmodelle (Werbung)	Direkte (Objektaufnahme/ Verbindungsgebühr) oder Indirekte Erlösmodelle (Werbung)	Direkte (Verbindungs- gebühr) und indirekte Erlösmodelle (Werbung)
Plattformen	E-Shop, E-Community, E-Company	E-Shop, E-Procurement, E-Marketplace	E-Community, E-Marketplace	E-Marketplace, E-Company, E-Community	E-Community, E-Shop, E-Marketplace, E-Company
Beispiele	sueddeutsche.de, manager-magazin.de, guenstiger.de	mytoys.com, amazon.com, expedia.de	yahoo.de, google.de, ciao.com	autoscout24.de, travelchannel.de, t-online.de	ebay.com, facebook.com, elitepartner.de
Mehrwert	Überblick, Auswahl, Kooperation, Abwicklung	Überblick, Auswahl, Abwicklung	Überblick, Auswahl, Vermittlung, Austausch	Überblick, Auswahl, Vermittlung, Abwicklung, Austausch	Überblick, Auswahl, Vermittlung, Austausch

Abb. 2 Die elektronischen Geschäftskonzepte der Digitalen Wirtschaft. (Quelle: in Anlehnung an Kollmann 2016)





2.3 Business Models of the Digital Economy (Kollmann 2020, p.30)

At the beginning of the digital economy, business models often existed in pure form. In the meantime, almost only mixed concepts (hybrid business models) can be observed.



Abb. 3 Beispiele für Mischformen der Geschäftskonzepte der Digitalen Wirtschaft. (Quelle: in Anlehnung an Wirtz 2013, S. 277)





2.3 Business Models of the Digital Economy (Kollmann 2020, p.29)

Revenue models

- The revenues primarily result from the directly offered digital <u>core service</u>. Thus, this represents the electronic added value, possibly in connection with a real product/service, for which the business model was originally developed and which leads to direct revenues.
- In addition, there are also **indirect sources of revenue** that are derived from the offer of the core service. In this case, **information** is generated in the core service that could be of interest to third parties. The prerequisite for this is that these <u>ancillary services</u> in turn represent an electronic added value for the buyer. The clientele of the ancillary service can differ from that of the core service.





2.3 Business Models of the Digital Economy (Kollmann 2020, p.30-31)

Revenue models

- Singular principle: The paid core service is the focus, there is no ancillary service. Information produced by the value creation process is not used economically.
- Plural principle: Both the paid core service and the marketable ancillary service are the focus. Information produced by the value creation process is used economically beyond the creation of the core service.
- Symbiosis principle: Information produced by the value creation process is not used economically. However, the core service is offered free of charge in order to obtain the information for the ancillary service (e.g. personalised advertising) in the first place. Information produced by the value-added process is only used economically via the ancillary service.





2.3 Business Models of the Digital Economy (Kollmann 2020, p.29)

Revenue models







2.3 Business Models of the Digital Economy (Kollmann 2020, p.30-31)

Revenue system

- Margin model: This model is used when an own service is sold directly to the customer. The costs incurred for the production of the service are calculated and extended by a profit margin.
- Commission model: If external services in particular are brokered to customers via platforms, a performance-based commission payment is made for the service broker. Very often used for affiliate programmes.
- Basic fee model: When offering transaction-independent electronic services, a fee is charged in the form of a fee (e.g. access fee, provision fee, admission fee).





What is an app?

- The term app (short form for the English term "application") stands for application software, is not protected and is used in various contexts.
- The term gained its popularity with the introduction of the Apple iPhone 3G, as well as by the opening of the "Apple App Store" in 2008.

Technological foundations

- In native app development, mobile applications are developed in the programming language supported by the respective operating system. Typically, the software development tools (Software Developer Kits, SDK) of the respective providers are used.
- **Web apps** are mobile web applications that only require a web browser to be installed on the device. They are typically based on HTML/HTML5 and Ajax.





Technological foundations

- A hybrid mobile app is a web application that is integrated into a native application. The web app is therefore not rendered in a browser, but in an element in the native app.
- Progressive Web Apps (PWA) are not applications that use a specific technology. The concept subsumes a set of strategies, techniques and interfaces (application programming interfaces, APIs) that are intended to enable the creation of applications that feel native.





Technological foundations

Technologie	Name	Sprache	Geräte	Webseite
Native App	Corona SDK	Lua	iOS, Android	https://coronalabs.com
Native App	Xamarin	C#	iOS, Android, Windows	https://visualstudio.microsoft. com/de/xamarin
Native App	Android SDK	Java, Kotlin	Android	https://developer.android.com/ studio
Native App	iOS- SDK	Swift, Objective- C	iOS	https://developer.apple.com/ios
Web App	Angular	Javascript TypeScript		https://angular.io
Web App	Meteor	Javascript TypeScript	-	https://www.meteor.com
Hybrid Mobile App	Ionic	JavaScript TypeScript	iOS, Android Windows	https://ionicframework.com
Hybrid Mobile App	Onsen UI	JavaScript TypeScript	iOS Android	https://onsen.io
Progressive Web App	Ionic	JavaScript TypeScript	-	https://ionicframework.com
Progressive Web App	Onsen UI	JavaScript TypeScript	-	https://onsen.io

Tab. 1 Übersicht ausgewählter Frameworks





App Economy

- Business models for distribution of apps on virtual market places is simple and structured.
- Apps programmed by developers and published on virtual market places.
- User download apps.







App Economy



Anzahl der angebotenen Apps in den Top App-Stores bis Oktober 2017

Abb. 4 Anzahl der angebotenen Apps in den Top App Stores bis Oktober 2017 (Statista 2017)





Pricing strategies

- Free apps that only serve marketing or non-profit or non-profit activities.
 However, the developers of such apps typically want to typically want to achieve a high reach, as their revenues are generated through advertising or user data. #
- Paid apps with classic model of selling. A product is product is developed and sold for a fee.
- **Shareware**: This is understood to mean the provision of mobile apps for a limited period of time and free of charge. When this limited period expires, access to the content of the app is closed.
- In-app purchase refers to the purchase of digital extensions or add-ons. This
 pricing model can be found in combination with free apps (freemium) or in
 combination with paid apps (paymium).
- **Subscription** pricing model where downloading the app is often free of charge. The use of the app or the content is paid for at regular intervals.