

# Lecture 1

## Introduction to Digital Communication

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# Topics

**Digital Goods**

**Digital Communication and Its Foundation**

**A Guide through Digital Communication**

# Digital Goods

***Digital goods are understood as **intangible resources** that with the help of **digital information systems** are developed, displayed, distributed and applied.***

Digital goods are -

- transmitted with the help of **electronic digital media** (e.g., the Internet or mobile communications networks)
- displayed and used with the help of **information systems**.

# Example of Digital Goods

Numbering first and foremost (also historically) among digital goods are

- *all forms of software*
- *digitalized media*
  - music
  - film
  - books
  - newspapers

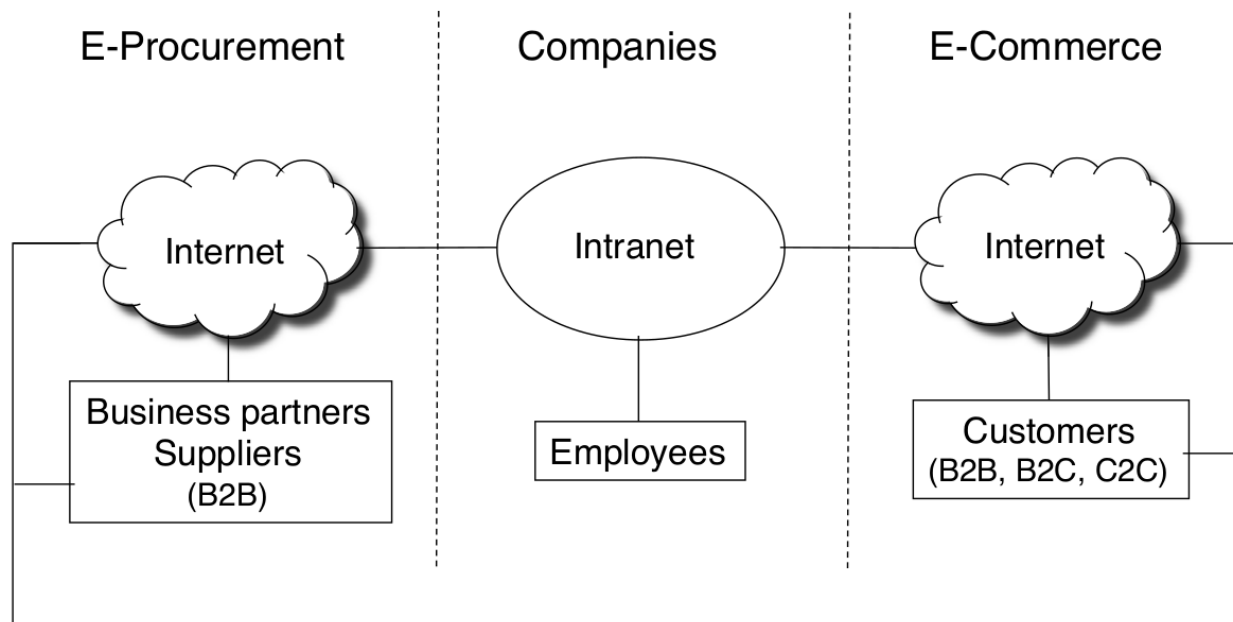
In the meantime, these forms also include tickets, reservations, cash cards, credit cards, stocks, forms, applications, contracts, letters, files, text messages and phone calls.

# Internet Economy

*The extensive digitalization of information and goods that makes it possible to **generate, process, copy,** and **execute** texts, images, videos, vacation tickets, subscriptions, financial transactions and other information, takes places **without a loss of quality** and **at a rapid speed**. This is known as – the Internet Economy (or Net Economy).*

# Internet Economy

- E-Business:** Describes all company activities that support business processes and relationships with business partners (Business-to-Business, B2B) or between employees and customers (Business-to-Customer, B2C) carried out with the help of digital media.
- E-Commerce:** Electronic commerce is that part of electronic business concerned with the agreements and processing of legally binding business transactions between business partners (B2B) and customers (B2C, C2C). E-commerce usually includes three transaction phases: information, agreement and processing.
- E-Procurement:** Refers to all activities directly connected to and in support of procurement activities (sales). These involve business partners and suppliers (B2B) and are a component of electronic business.



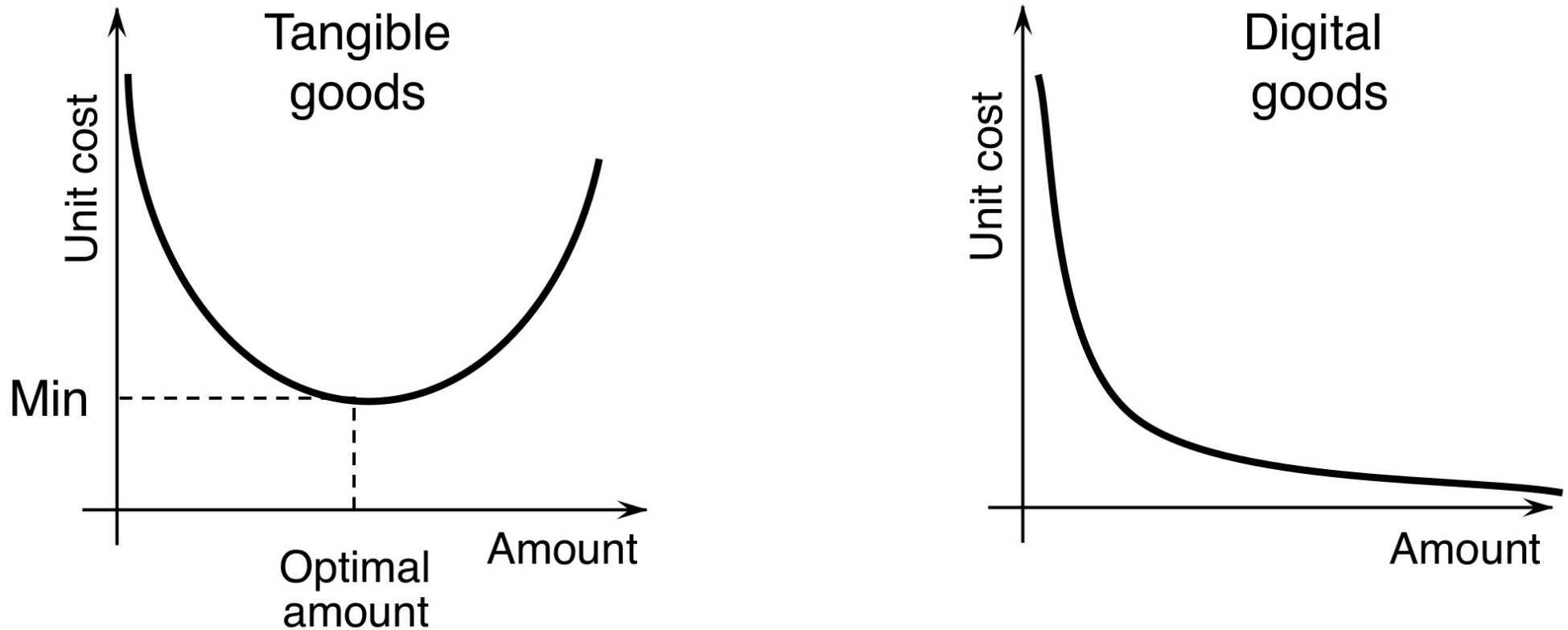
**Fig. 1.1** E-Business – business processes and relationships.

# Internet Economy

**Table 1.1** A comparison of the properties of tangible and digital goods.

<b>Tangible goods</b>	<b>Digital goods</b>
High duplication costs	Low duplication costs
Decrease in value through use	Increase in value through use
Individual ownership	Multiple owners possible
Value depreciation by sharing	Value appreciation by sharing
Identification and protection possibilities	Problems with data protection and data security
Challenging dissemination (logistics and distribution)	Simple dissemination
Value / price easily determinable	Value/price only subjectively determinable
Costs easy to identify	Costs difficult to identify
Price setting mechanism known	Price setting mechanism largely unknown
Inventory evaluation possible	Inventory evaluation problematic
Economic theories and models established and available	Theories and models rare

# Internet Economy



**Fig. 1.2** A comparison of production costs for tangible and digital goods.



# Digital Rights Management

The possibility of essentially *free* and *instantaneous reproduction* has turned the digital good into a ***mass product***.

With good reason a significant portion of the development costs for digital goods is invested in mechanisms to ensure copy protection. Digital goods should be restricted to individual users or to a specific digital device to prevent unauthorized transfer and duplication. There are many different models of “*Digital Rights Management*”.

A constant battle is going on between the industry, who want to develop the safest possible copy protection, and “*hackers*” (joined by “*crackers*”), who attempt to bypass and break the current security measures. Once copy protection has been broken, a rapid process begins with the end result being the massive illegal dissemination of a previously protected digital product.

# Some Notable Digital Goods

Digital goods are saved on files or made available on the Internet. Electronic devices are essential for their processing and display. The central element of these devices is normally *a computer*, even when it not always recognizable as such today.

- **Software**, in the sense of application programs, initiates the computer to execute predefined functions. The spectrum of these range from those involving the operating system (the basic software of every computer) to computer games, word processing or email.
- Digital **texts** have been an established part of everyday life for quite some time. Every well-known daily newspaper maintains a more or less detailed digital counterpart of their print edition, providing us instantly with the latest news.

# Some Notable Digital Goods

- **Email, instant messaging** and **weblogs** have become an integral part of our text-based, electronic communication cannon.
- Popular literature can now be read comfortably on **eBooks** – irrespective of time and place. These book-like devices in pocket format are loadable with electronic texts and equipped with innovative and easy to read display technology.
- Traditional radio faced a new competitor in the form of **Internet radio**, which allowed its listeners a much more personalized program format.
- Digitalization and compression also include the media of **film** and **television**. Uncompressed digital video data requires an immense storage capacity. However, modern video compression technologies also make a delay-free and viable exchange of moving images via the medium of Internet possible.

# Digital Communication and Its Foundation

**The Internet** – the infrastructure of our virtual world – is a global network amalgamation made up of the most different computer networks, company networks, science networks, military networks and networks of local or regional operators.

These are based on many different kinds of transmission media, whether copper cable, optical fibers, radio waves and network technologies.

*It only took **three decades** for what began as an experimental network consisting of just four computers in 1969 to evolve into a web of hundreds of millions of computer and multiple networks.*

# Digital Communication and Its Foundation

The technology called **internetworking** enables digital communication across borders via a multiple number of non-compatible networks. This is governed by a fixed set of rules known as **communication protocols**.

***The connected computers can communicate with each other irrespective of their individual physical connection to the Internet.***

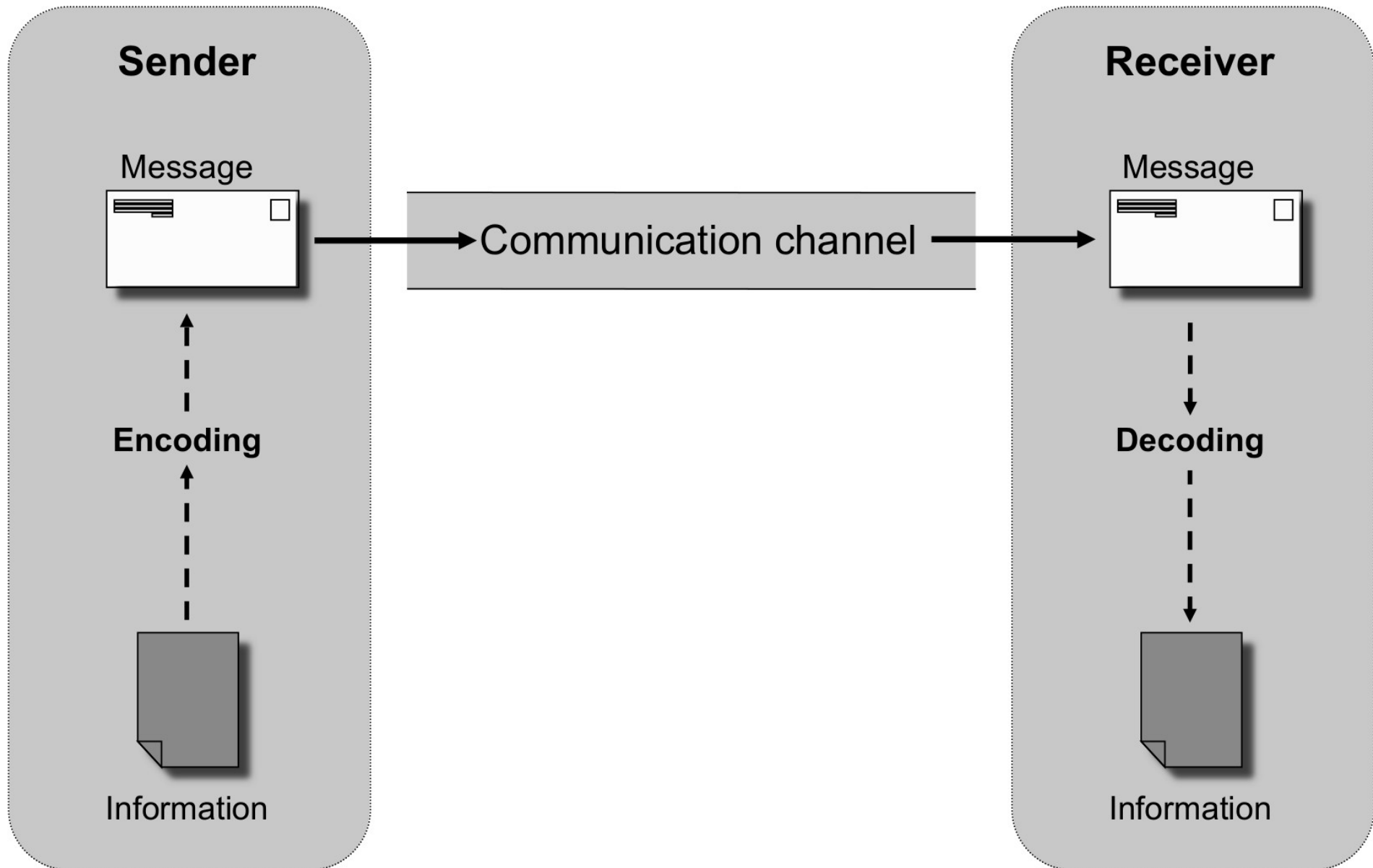
# Digital Communication and Its Foundation

***One of the reasons that lead to the Internet's huge dissemination is its **open system architecture**.***

It is open in the sense that all required Internet specifications are available publicly and accessible to everyone – in contrast to the proprietary networks of certain providers.

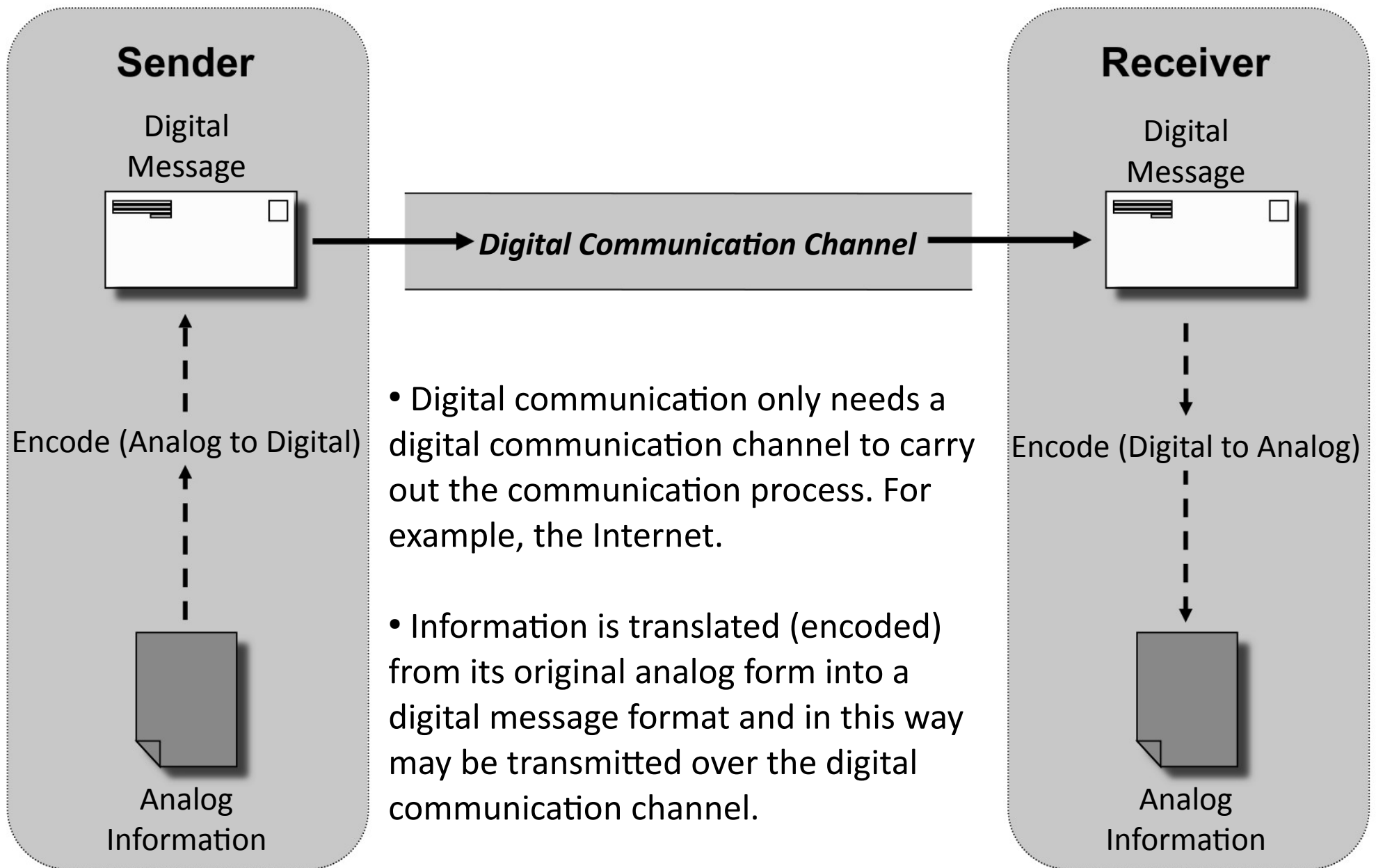
The entire design of the Internet communication protocol is intended to enable the most different computers and networks to communicate with each other, independent of their various operating systems and application programs.

# Digital Communication Model



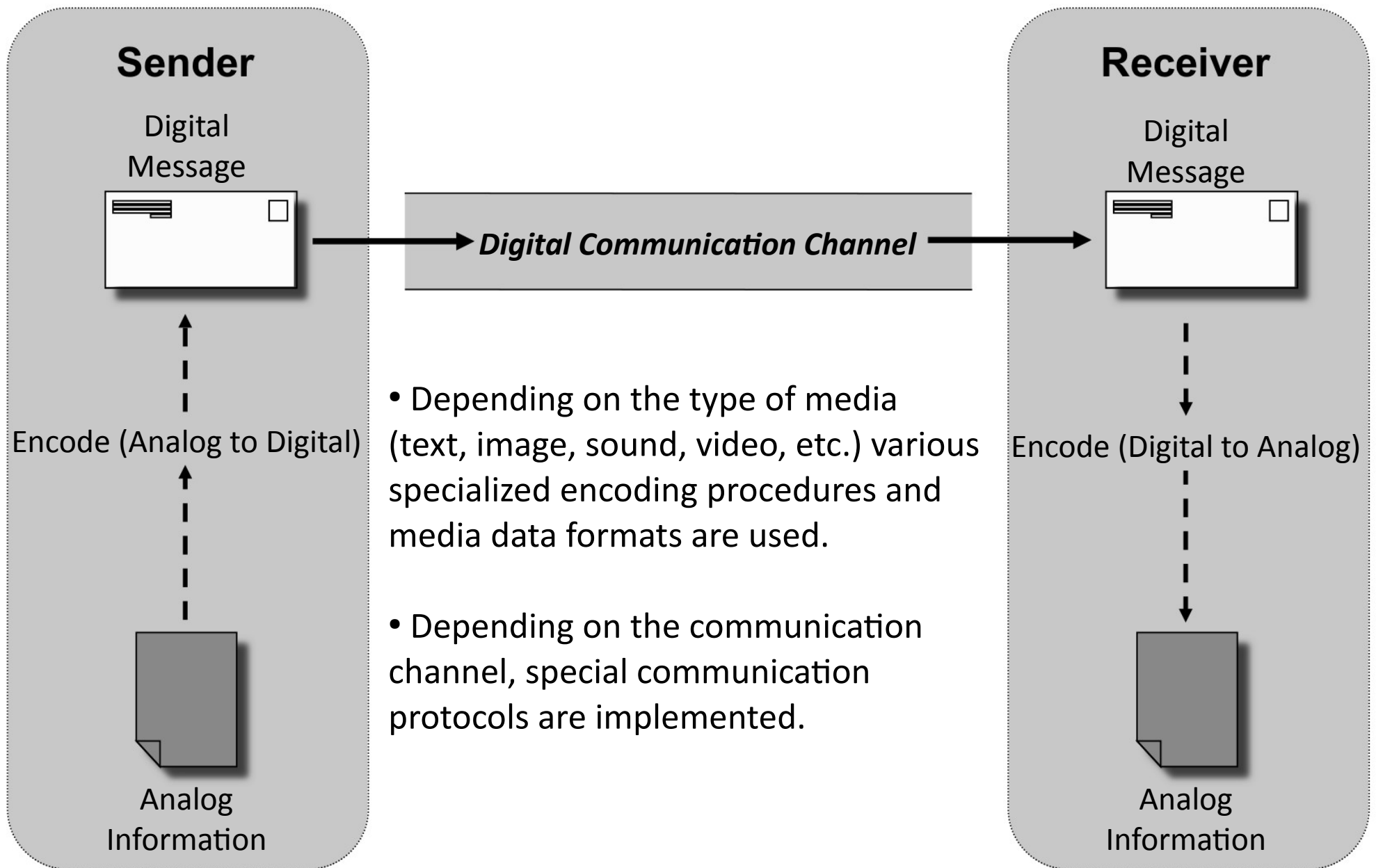
**Fig. 1.3** Communication model seen from the information theory perspective.

# Digital Communication Model





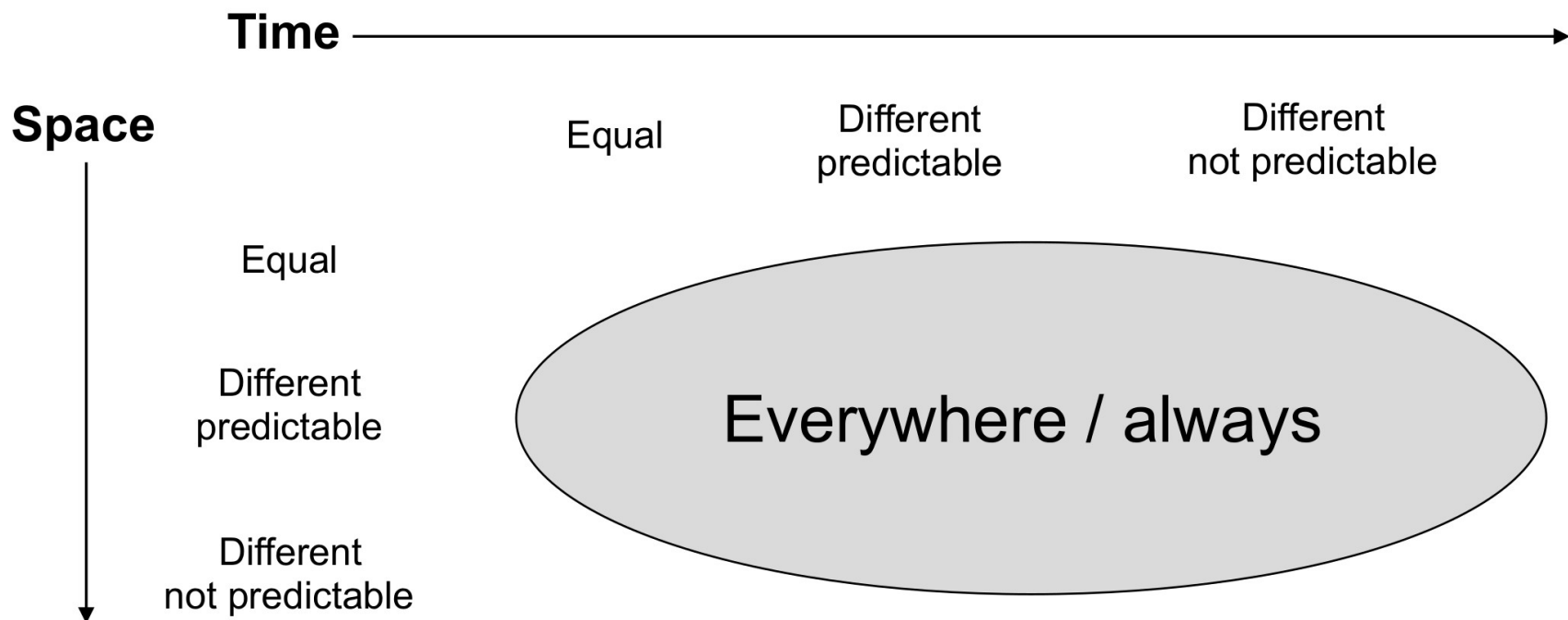
# Digital Communication Model



# Digital Communication

***Digital communication opens for us the door to the new, virtual world.***

*Virtuality allows the communication to be decoupled from time and space. Digital communication is **no longer fixed to a certain place** like physical communication.*

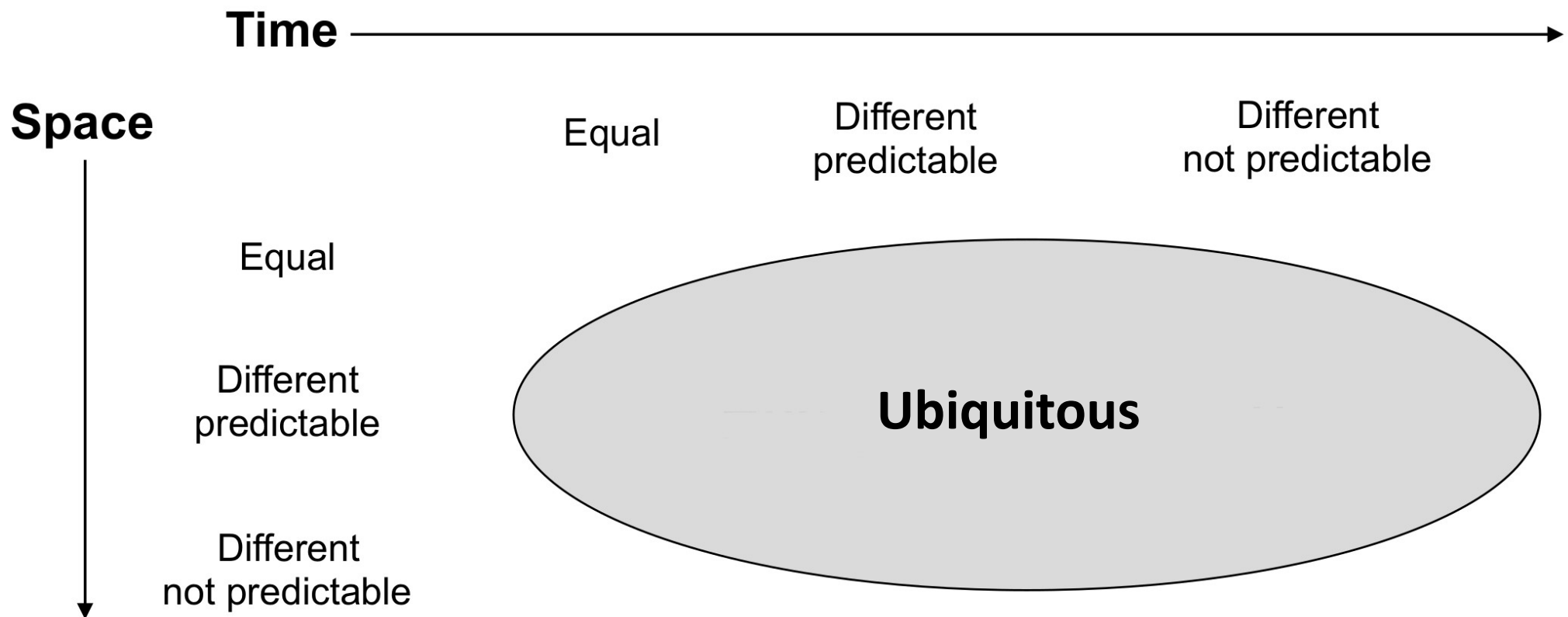


**Fig. 1.4** Virtual communication.

# Digital Communication

*Digital communication is **ubiquitous**, in other words it is **possible everywhere**.*

*Communicating with other people is no longer an issue of physical distance, but one of the type of virtual communication possibility desired.*



# Digital Communication

For a large variety of the different of types of media – whether text, image, audio or video – there are various media data formats available.

*This palette of media types transforms the digital network into a **multimediu**m, whose various forms are referred to as **multimedia**.*

In contrast to traditional “one-dimensional” media, it is now possible to display and convey complex contents more efficiently through the simultaneous use of complementary media building blocks.

# A Guide through Digital Communication

**Computer networks** serve today as the transport medium and communication channel of digitally transmitted information. These networks range from the piconet, linking several small devices in the immediate vicinity of the user, to the general global Internet.

**Encoding** is carried out in accordance with the modality of the transported information. Depending on the type of media sent (text, image, audio, video, etc.), different specialized data formats are used.

The aspect of **security** stands in the focus of public interest in a much greater way and in a higher dimensionality and drama than in traditional analog communication. Today, the ubiquitous network enables anonymous access to information and at the same time opens the door to numerous opportunities to carry out manipulation and fraud.