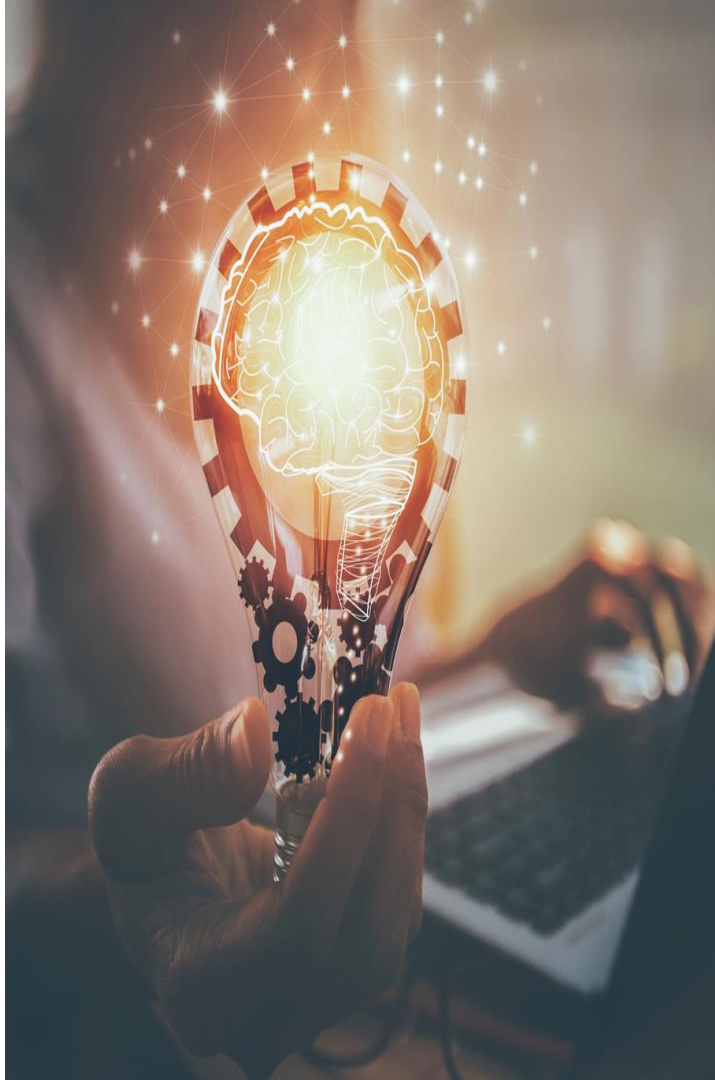
Module 5: INNOVATIONS IN SKILLS, POLICY DESIGN AND EDUCATION SYSTEM GOVERNANCE



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Module: Innovations in skills, policy design and education system governance

University governance

1 … in the field of research and development

- Digitalisation in the focus of higher education governance
- Research in a digital age
- Research networks

2. … in the field of higher education

- Quality management of digital learning formats
- eTeaching: Tasks for university management
- Paradigm shifts: Individualised and personalised learning
- Curriculum design in a digital age

3. … in the field of knowledge transfer and science communication

- Knowledge Transfer
- Digital science communication
- Further and adult education in a digital age

1. University governance in the field of research and development

- Digitalisation in the focus of higher education governance
- Research in a digital age
- Research networks

Digitalisation in the focus of higher education governance

Effects of digital transformation

- Contents of education
- An education provider is itself an organization running processes and is thus directly subject to digital change;
- An education provider may act as a change agent for the regional community and collaborates with others in national and international research and education networks.

Digitalisation in the focus of higher education governance

- „Digital Education Action Plan“ (EU, 2018) to promote European school and training systems and higher education to develop digital competences and skills; establishment of a dedicated "pan-European platform for digital higher education.
- European research framework program "Horizon Europe“ (2021-2027) to promote innovative, disruptive research
- “European Universities”: Association of higher education institutions. This should lead to new forms of European study programs and European degrees or new forms of networking and mobility.
- “Digital Europe”: focus on high performance computing, artifical intelligence and cyber security, and ensuring widespread use of digital technology across the economy and society.

Digitalisation in the focus of higher education governance

Dimensions of HEIs-governance

- Mission attainment (whole university, faculties, institutes)
- Scientific Advisory Board
- Human Resources
- Financial distribution
- Operational feedback processes
- Innovation potential

Digitalisation in the focus of higher education governance

Governance instruments that are decisive for the monitoring, steering and development of the higher education system

Development plans of the individual universities

Performance agreements

Quality assurance and development systems

Financial and budget controlling

Thematic strategies (e.g. on university mobility, social dimension)

Thematic governance structures (e.g. Research infrastructures)

Intellectual capital reports and other accountability instruments

Thematic networks (e.g. on Open Access or Open Educational Resources)

Dialogue and dissemination processes (e.g. on the Bologna Process, dialogues/trialogues with university councils, university senates and other bodies or organisations).

Country strategies to promote innovation, research, digital development, ...)

Digitalisation in the focus of higher education governance

Example: Shaping the digital transformation through networks and cooperation - What design options are there for studying and teaching?

Digital transformation can only work by joining forces and thinking together - through networks of the relevant actors. Through university governance, this idea can be taken up in different ways.

a) Networks within the university

a) Cooperation within the university network

c) Networks with external partners

Source: [8]

Example

Working group “open TUHH”

Since 2017, the "open TUHH" working group at the Hamburg University of Technology has been examining the potential for study and teaching from a strategic, structural and cultural perspective. Its members include the Vice-Presidents for Research and Teaching, the Digitisation Officer for Teaching, management and teams from the Computer Centre and Library, as well as staff from the Institute for Technical Education and University Didactics.

Through the working group, university staff are made aware of the potential of digitisation in teaching through various measures and supported in its realisation. The TUHH has had an open policy since 2018. The blog "INSIGHTS" reports on the TUHH's digital experimental field in research and teaching. For students and graduates, there are workshops on digital tools, such as working with the web application GitLab with a focus on collaboration and interdisciplinary teamwork.

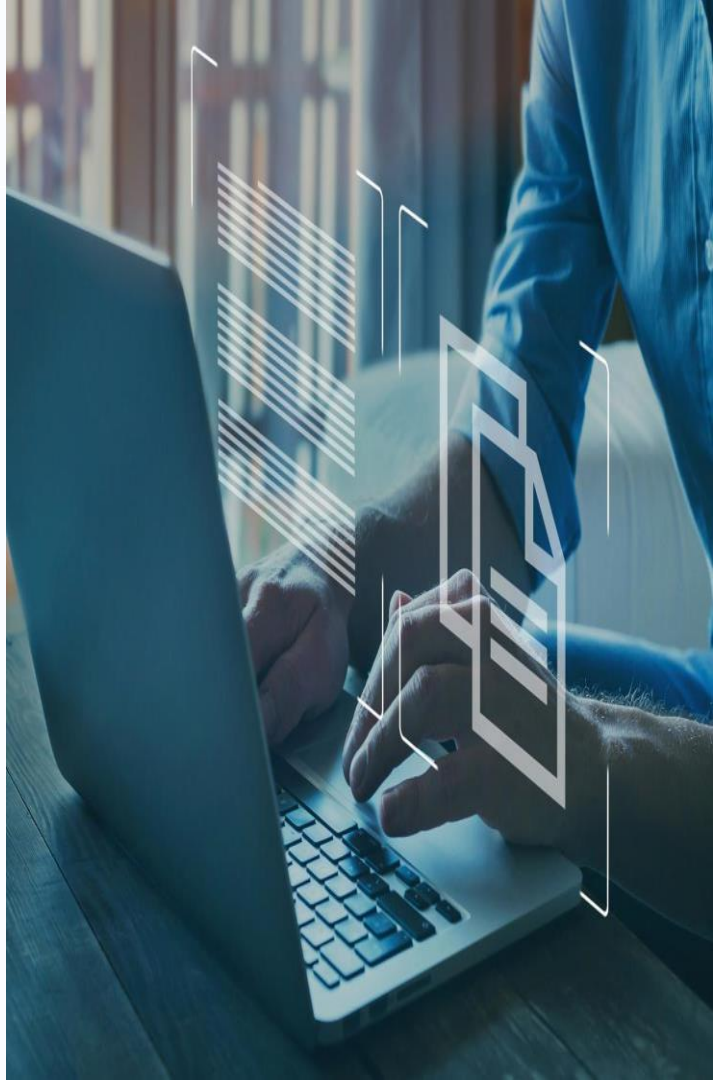
Goals and measures are evaluated in the working group, adapted and integrated into the overall strategic structure of the TUHH in the long term. Today, the working group is an integral structural component in the design of digitally supported, open teaching and learning opportunities.

Source: [9]

Research in a digital age

Challenges for science and research

- Openness of science: various currents that aim to make science more easily accessible to a greater number of people (Open Data, Open Source, Open Access, Open Science, Open Educational Resources, Open Innovation Hub University, Open Metrics, ...).
- Citizen Science: participation of persons in scientific processes who are not institutionally bound in this scientific field; scientific process openly accessible, traceable and reusable via the Internet.
- Differentiation of the higher education market: new digital university offerings (online programs, new forms of certification, online universities); increased focus on market needs; public vs. private higher education
- AI: new dimensions of data; new evaluation methods; self-learning systems; new scientific fields e.g. Digital Humanities, ...



Research in a digital age

Facets of digitalisation in research

- the adoption of digital scientific collaboration and productivity tools throughout all stages of the scientific process;
- the digitally-enabled diffusion and access to data and code;
- the use of advanced and data-intensive digital tools to gain insights and develop predications;
- the development of digital identity and online communication of scientific work.

Potential impact

- New quality
- Internationalization of research
- Practical transfer of research results
- Forms of self-organised cooperation
- Simplification of workflows

Research in a digital age

Digital Research Services – Implementation of structur

Typical tasks:

- Research Data Management;
- Consulting/Training
- Research Software
- Data Visualization
- Scholarly Communication

Research data cycle
https://www.kit.edu/forschen/13557.php

Research in a digital age

Research data management – a key challenge for HEIs management

Strategic activities in RDM

formulation of RDM-guidelines;

Using the Research Data Management Organiser (RDMO) tool to write data management plans (DMPs);

Open Source Program Dataverse to permanently secure research data, make it publicly available in open access;

2. University governance in the field of knowledge transfer and science communication

- Quality management of digital learning formats
- eTeaching: Tasks for university management
- Paradigm shifts: Individualised and personalised learning
- Curriculum design in a digital age

Quality management of digital learning formats

Variety of digital formats and application forms in higher education

Adaptive Learning

Blended Learning

Personalized Learning

E-Textbooks

Badging and Gamification

Microlearning Assets

Mobile Learning

Learning Analytics

Inverted Classroom

Virtual Reality

E-Learning

Open Educational Resources

Synchronus Online Learning

E-Lecture

Open Course and MOOC

Quality management of digital learning formats

Quality in e-learning

Quality in the context of digital learning formats can be considered process-oriented or product-oriented. On the one hand, it is about the process and the implementation, and on the other hand, it is about the teaching-learning products used in the educational process.

Quality in education can be considered on different levels:

- At the level of study programs, accreditation procedures ensure quality;
- Evaluation and quality assurance of learning products;
- Technical standards of tools used;
- Competence development of the teaching staff;
- Student feedback.

Source: [7]

Quality management of digital learning formats

Levels of quality assurance and development for digital teaching and learning

Makro level (University management/administration)
- Definition or orientation towards a strategy/ a mission statement
- Framework conditions of quality management and quality development

Meso level (concrete actions)
- Consulting, Service
- Evaluation
- Further training

Micro level (Teaching)
- Adherence to media-didactic principles in the creation of media
  products, e-learning content & course design (quality criteria)

Example

Seal "Excellent in digital teaching"

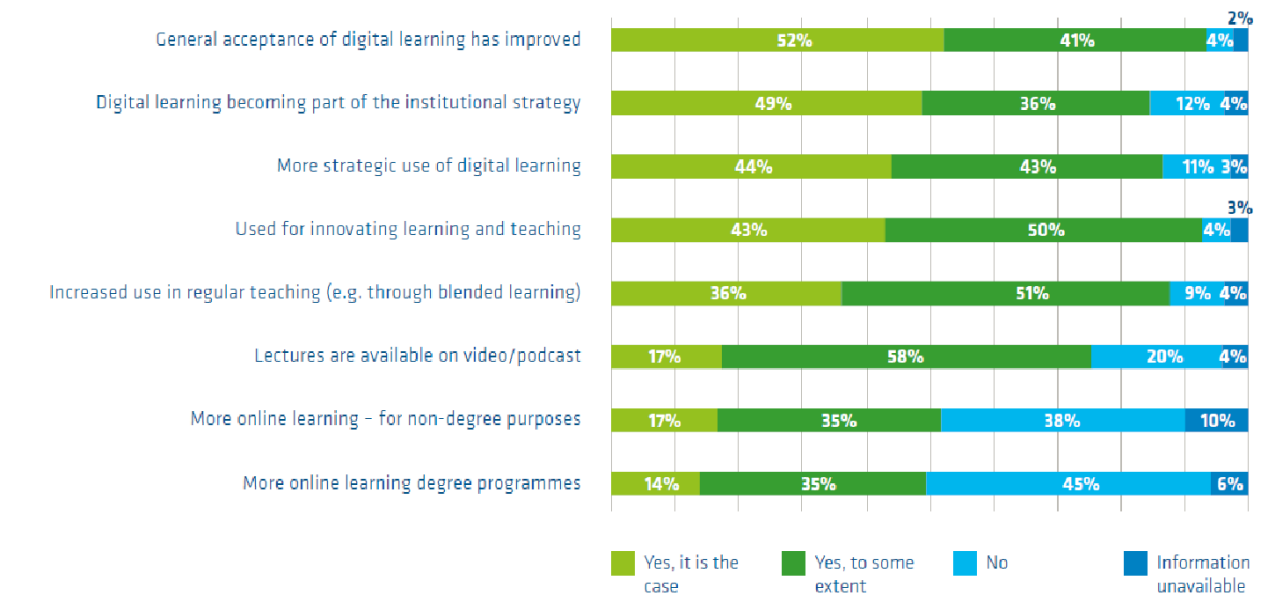
What standards are necessary to continue the new teaching and learning formats in a quality-assured manner? This is where FIBAA comes in and has developed a new certification for "**Excellence in Digital Teaching**". FIBAA is a quality assurance agency. With its procedures at institutional level (system accreditation, institutional accreditation), FIBAA addresses all higher education institutions and other education providers across disciplines. The new Seal is based on the "Occasional Paper 26" of the European Association for Quality Assurance in Higher Education (ENQA) on the subject of "Considerations for quality assurance of e-learning provision". The main points of the certification are the following: Standard 1: Strategy for the digitisation of the teaching and learning offer, Standard 2: HR, Standard 3: Technology, Standard 4: Didactic Design, Standard 5: Quality control
The seal can serve as an extension to institutional procedures (institutional audit, system accreditation, institutional accreditations). Likewise, a study area/faculty can also be institutionally certified here for excellent digital teaching or apply with an individual study program/further education course. In spring 2021, three higher education institutions from the DACH region (Germany, Austria, Switzerland) will undergo the new FIBAA certification in a pilot process.

Source: [9]

eTeaching and smart learning: Tasks for HEIs

Main trends at HEIs institutions regarding digital learning in the last three years.

Responses from higher education institutions from 48 countries, representing the entire EHEA in 2020



Source: [13]

1.2. eTeaching and smart learning: Tasks for HEI´s

Smart learning – Learning model of the future?

Learning in the Smart Learning Environment (SLE)

SLEs are physical environments enriched with digital and context-sensitive components to enable faster and better learning. [16]

- provides personalised feedback or assistance
- interacts with the user through multiple channels (e.g. via smartphones or other ubiquitous computing devices)
- offers customised learning content for individual learning needs
- takes into account personal factors as well as external environmental influences (e.g. personal learning needs, preferences, etc.)
- refers to learning strategies and tools
- supports formal and informal learning
- understands and takes into account the real (learning) context [17]

Source: [15]

eTeaching and smart learning: Tasks for HEI´s

Strategic thematic fields for the design of digital university teaching

- Digitisation of teaching is part the overall strategic development of the university
- Provision of service offers and measures for further qualification and networking of teaching staff
- University didactics develops research-based and practice-oriented offers for the digital design of teaching and concepts for their implementation
- The accreditation of study programs ensures that digital competence curricula are appropriately anchored in the study programs

Example

Smart Learning Platform 4.0

Due to the changed requirements of a digitalised working world, the Stuttgart University of Applied Sciences has set itself the goal of offering students realistic industrial environments and has set up an Industry 4.0 laboratory with mobile, stationary and virtual components . The aim is to enable students to work more collaboratively in interdisciplinary, interprofessional, intersectoral and international contexts. For this purpose, a learning parkour is created, which the students go through within seven semesters. Topics from Industry 4.0 and the Internet of Things (IoT) are included both in terms of content and practice in order to achieve creative opportunities for experimentation, active participation and joint learning through real experiences with technical systems at the university as well as in the private environment.
The model developed should be transferable to other study programs. In the future, personalised support for the individual learner is also to be implemented by reflecting back the results of the assessment of learning successes and thus enabling the students themselves to learn more about their own learning behaviour.

Source: [18]

Good practice

Competence Centre for Digital Teaching and Learning, University of Wuerzburg

The Competence Centre for Digital Teaching and Learning (DigiLLabs) at the Professional School of Education addresses teaching and learning with and via digital media in teacher education as well as in schools and classrooms. With the participation of seven faculties, cooperation in research and teaching takes place in five subject group networks as well as in an interdisciplinary think tank. Six rooms for digital teaching and learning have been set up in the Competence Centre for Digital Teaching and Learning. These rooms provide the professional and infrastructural prerequisites for a comprehensive anchoring of digitalisation in the studies of (teacher training) students and serve to promote competences in teaching and learning with and via digital media.

Source: [23]

Curriculum design in a digital age

LEBLANC describes three challenges that HEIs will have to deal with:

1. development of a coherent learning eco-system in which learners move in and out over a lifetime;

2. HEÍs need to move away from the idea of a "one size fits all model of education" ;

3. Previous educational content must be reconsidered due to changed occupational profiles. [39]

Source: [38], [39]

Curriculum design in a digital age

“Curriculum 4.0” - How curricula must be changed in the digital transformation to prepare students for the demands of the digital knowledge society?

Curriculum 4.0 - a curriculum that addresses the process of digital transformation in a targeted manner.

Components of curriculum development

Digital teaching methods: it ranges, for example, from the simple use of PDFs or online teaching platforms for seminar organisation to preparation-intensive blended learning approaches. In addition, the field of digital teaching methods is also highly dependent on the individual teacher.

Digital teaching content

Curricularly anchored digital competences

Source: [40], [41]

Curriculum design in a digital age

“Curriculum 4.0” - Imparting data literacy skills

Structures and collaboration

- Building appropriate infrastructures and space in the curricula, access to best practices and data
- Further training of the heads of department, convincing the university leadership and launching measures
- Building collaborations across departments, disciplines and industry, creating a community of practice and a shared space with access to resources.

Competences and integration

- Establish "data education" labs to better support self-study.
- Start early at school level by training prospective teachers.
- Build a standardised competency framework for data literacy.

Competence mediation

- Data literacy should become a basic requirement for accredited programs.
- Data literacy education should be standardised.
- The teaching of data literacy skills should be done with a domain expert and a data scientist.

Source: [44]

3. University governance in the field of knowledge transfer and science communication

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Knowledge Transfer

Digital transformation at HEIs – Impacts and Challenges

Digital Administration

Digital Knowledge Transfer

Digitized Teaching,
Digitized Continuing Education

Digital Research

Knowledge Transfer

Digital Knowledge Transfer – A diverse field of activity

Digital Stream Activities

Developing a digitally competent workforce

Entrepreneurial University

Digital participation and policymaking

Science communication in social media

Massive Open Online Course (MOOC)

Big Data, Educational Data Mining

Online training

Online services for the industry

Free teaching and learning materials

Digital regional development

Non-profit online services

Online knowledge and technology transfer

Create understanding for science in society

Knowledge Transfer

Requirements for KT

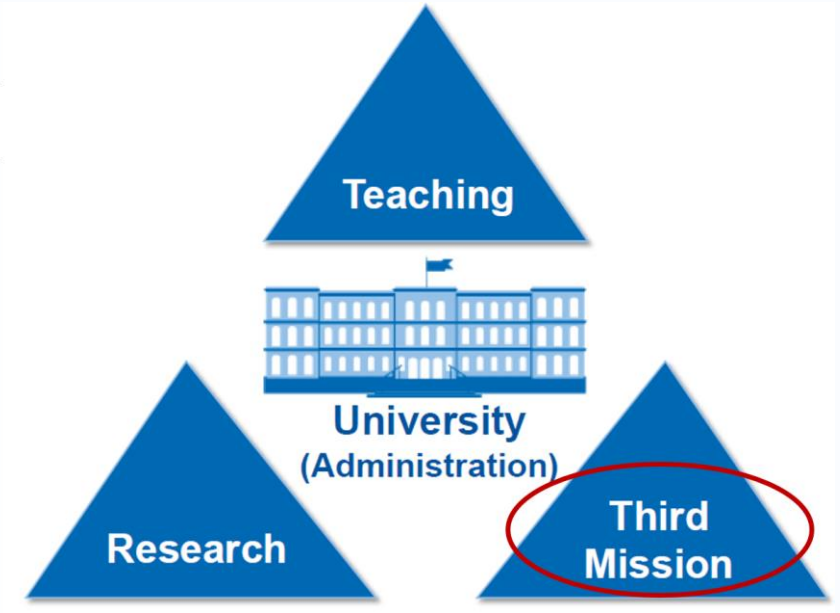
Knowledge transfer at HEI´s takes place

- at different **levels** (within the university (micro level), between different universities (meso level) as well as outside (macro level))
- through different **channels**,
- in different **directions** and
- in different **intensities.**

Technical and structural requirements (digital tools, scope for action, organizational support, cooperations, structural units for transfer)

Cultural requirements (different organizational cultures of disciplines, among the students, scientists of the individual subjects and the administration)

Personal requirements (motivation, digital skills, communication skills)



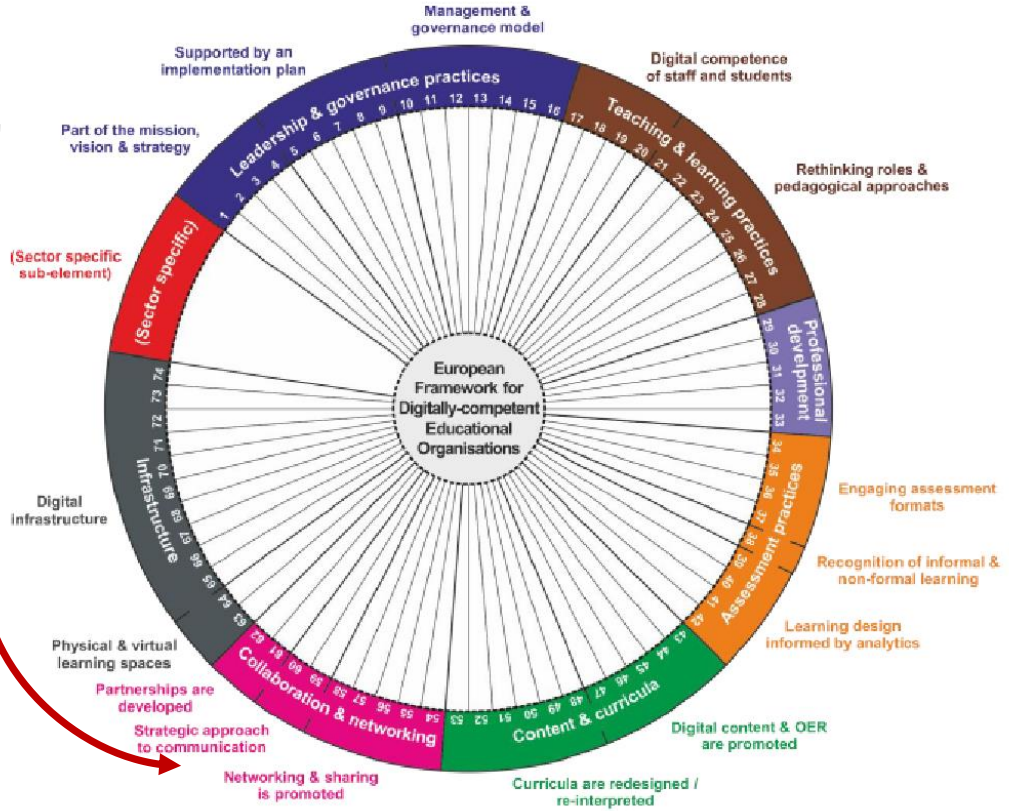
Source [9]

Knowledge Transfer

Digitally-Competent Educational Organizations" (DigCompOrg) as a conceptual framework.

Understand KT as an integral part of the overall institutional digital strategy

You can use the framework for guiding a process of self-reflection on your progress towards comprehensive integration and effective deployment of digitally competent organization.



Source: [12]

Knowledge Transfer

Development of KT strategy – a participative process

The formulation and implementation of a transfer strategy is an institutional task of HEI´s management and requires specific governance structures. **Strategy development** requires explicit model conceptions of transfer, for example with regard to the interlacing with research phases, the need for coordination, coordination as well as cooperation, the requirements for planning and management or quality assurance..

The transfer strategy should be designed as a comprehensive, **two-way process** in exchange with the cooperation partners and as an integral part of an overall strategy with the classic elements of a planning/management process:

- analysis of potential,
- development of a mission statement,
- medium- and long-term strategic goals,
- measures for implementing and
- monitoring the achievement of goals.

Source: [11]

Example

Transfer model – Leuphana University Lueneburg

Core fields of action

Science communication: External communication, Internal communication, Transfer events, Knowledge management **Consulting:** Application advice for transfer projects, Transfer consulting, Start-up consultancy, Scientific consulting
Cooperation: Networking, Collaboration spaces, Development of offers, Personnel exchange
Projects: R&D-Transfer projects, Practical teaching projects, Contract negotiation
Exploitation: Patents and licences, Spin-offs, Strategic partners, Impact measurement

The project "**Digital Knowledge Transfer Model**" tests new formats for knowledge and technology transfer - especially using digital solutions - in order to make research and development results of the university accessible to a broad interested public.

Source: [16]

Digital science communication

Science communication - a task field of KT

This includes both internal communication with the various stakeholders within the university and external communication with regional and supra-regional practitioners.

As a strategic and operational cross-sectional task, communication in the KT

- ...provide information,
- ...connect stakeholders,
- ...build and organize trust and reputation,
- ...promote the production and exchange of knowledge inside and outside

Communication in transfer has the task of initiating and **organizing cooperation** and **collaboration**.

Source: [23]

Digital science communication

How science communication can look like

@realscientist

@3mKa1

@CERN (European Organization for Nuclear Research)

The secret life of scientists

thebumblingbiochemist

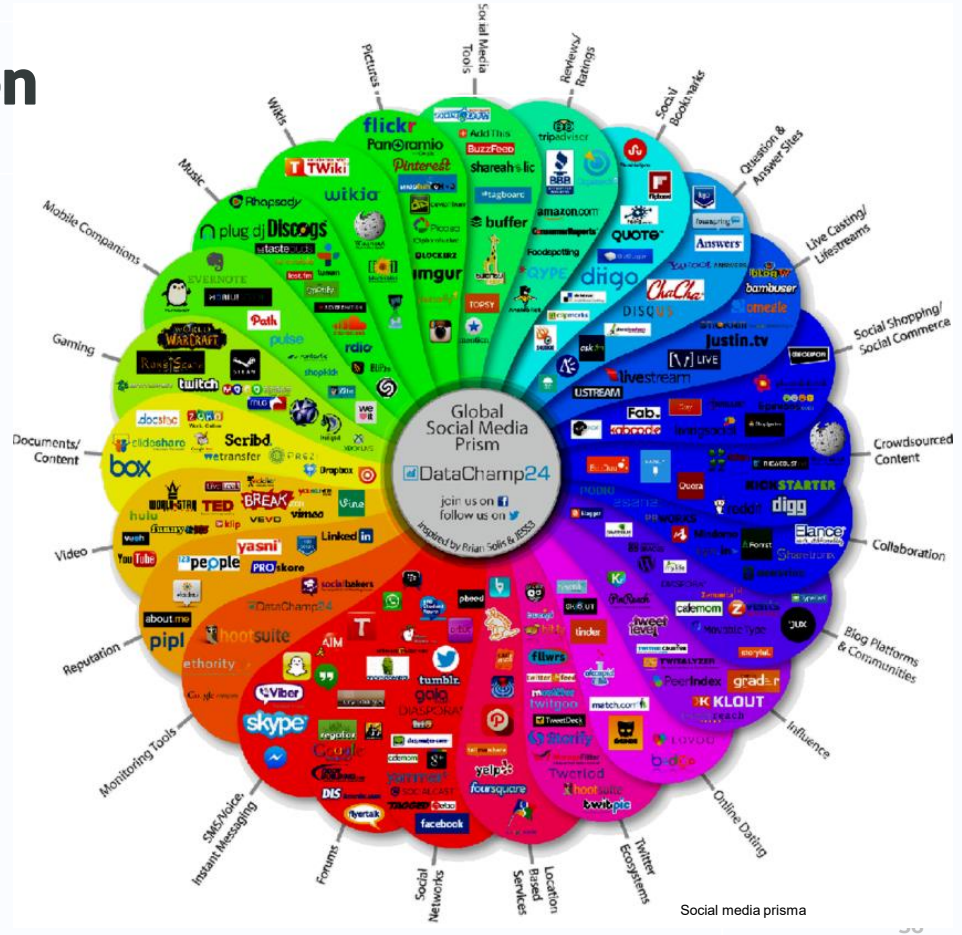
Imperial College London students blog

Digital Science Communication

Diversity and structure of social media

Social media is a potentially wide-reaching instrument for universities in the areas of teaching, research, external presentation, internal communication and third mission.

- Blogs and microblogging services such as Twitter,
- topic-based networks, e.g. those geared towards scientific exchange, Researchgate.net or Academia.edu,
- thematically open networks such as Facebook,
- collaborative projects such as Wikipedia,
- networks specialising in individual types of media, e.g. Youtube for videos or Instagram



Social media prisma

Source: [24]

Digital Science Communication

Basic forms of science communication

Primarily problem-solving-oriented science communication

knowledge transfer (in business and society) and scientific advice (policy advice and organisational advice)

Primarily public-oriented science communication

Science in the media public sphere (public relations, crisis communication, science journalism); science popularisation and scitainment (science-linked education through entertainment)

Problem-solving and public-oriented science communication

Practices of Public Science (e.g. Citizen Science or Public Sociology); knowledge communication for local and regional developments; crisis aid communication in the public interest and science-policy communication of science (aimed at improving its own action)

Source: [27]

Example

NaWik - National Institute for Science Communication, Germany

The NaWik teaches scientists, students and professional public relations workers the basics of good science communication. The stakeholders are the Klaus Tschira Foundation and the Karlsruhe Institute of Technology (KIT). NaWik offers wide range practice-proven training and further education formats that provide participants with a high utility value for their everyday professional life. Seminars are on **scientific writing** and **communicating science online**, also **presentation skills training** and **media training**, as well as workshops where participants develop their own **communication strategy**.

Projects: WissKon - conference for communicating scientists; Science In Presentations; WISSKOM - Practical study module "Science Communication for Master students, Risk communication on artificial intelligence

Source: [28]

Digital Science Communication

New ways improving science communication

New forms of information provision (curation of content and information or the introduction of newsrooms by complementing them with social media) f.e. Storytelling, Best Practises

Social media is an integral part of KT and communication. Facebook, Twitter or LinkedIn enable the maintenance and development of networks in the sense of social relationship management.

Classic conferences, lectures and workshops can, for example, be designed with live streaming or audience response systems, cross-media and interactive.

The expansion of real space through visual, virtual overlays, augmented reality (AR), offers exciting possibilities for use in knowledge transfer (f.e. “AR-Studio”, “ARKit2”).

SEO (Google search engine optimization) as a communication tool between science and practice. Improve the communication strategy for knowledge transfer with more visibility among stakeholders (Push strategy, the impulse comes from the transfer area or cooperation service. In the pull strategy, the initiative comes from the actor interested in cooperation).

Use of the instrument of “influencer communication” for the transfer (Science-to-Business S2B).

Source: [29] [30]

Good practice

Department for Science Communication
Karlsruhe Institute of Technology

The Department of Science Communication is part of the Institute for Technology Futures (ITZ). The ITZ is dedicated to humanities and social science reflection on the relationship between humans, technology and the environment. A variety of approaches to innovative forms of science communication are researched and implemented.

“Science in presentations”: What forms of presentation do scientists prefer when they appear in public?

"Science for all: How can science communication succeed with previously unreached target groups?“

“MEDIANEURO”: Medialising brain diseases: interactions between research and mass media

Source: [36]

Good practice

Digital Business University (DBU)

The DBU is a business school for the digital age. Teaching and research activities are consistently geared towards a digital economy & society. On offer are for example programs like Data Science & Business Analytics, Digital Responsible Leadership, Digital Marketing & Communication Management (B.Sc.), Data Science & Management (M.Sc.).

One main focus is on training opportunities that prepare employees and companies for the digital transformation. Courses are organised on the basis of agile learning sprints. These are short, flexible learning units with a maximum learning time of 15 hours that teach a wide range of digital skills. They can be completed anywhere and at any time via a multimedia online course. A badge according to the OpenBadge standard is awarded for successful participation in a LearningSprint. Several LearningSprints can also be combined into individual courses that conclude with an academic certificate.

Source: [47]