Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Digital strategy

UHH.DIGITAL 2028

As a University of Excellence, it is our responsibility to advance Hamburg's status as an internationally visible city dedicated to scientific pursuit. To this end, we seek not only to expand the excellent research taking place here today but also to train the brightest minds of tomorrow, so that our knowledge and innovative energy may inspire the entire metropolitan region. We must tackle the great social challenges of our time. For the University's strategic development, this means that we must master and actively advance the twin transformation—sustainability and digital—together. Only few technological sea changes of the past have had similarly significant implications, both for society as a whole and for the University as a knowledge organization. Universität Hamburg's digital strategy is the toolkit that will allow us, the University community, to complete this necessary transformation comprehensively, autonomously, and successfully. We will take advantage of all the benefits digitalization offers in the areas of studies and teaching, research, administration, and knowledge exchange while making a contribution to digital and data literacy among our graduates. We will train the computer scientists our region so desperately needs and lead our University into the future as a modern, dynamic research hub.

Prof. Dr. Hauke Heekeren,
President of Universität Hamburg

We are in the middle of the digital transformation, a process that is taking the world from analog to digital, and our lives are increasingly shaped by digitalization and digital media, tools, and communication methods. As a university, we are a pioneer and driving force of innovation in society. It is our duty to be at the forefront of the digital transformation by advancing it and providing the required human, material, and intellectual resources to guide the process. At the same time, universities are modern knowledge organizations. Most of our knowledge already exists in a digital format today, be it in research, teaching, or knowledge exchange.

What does this mean for us? In the future, we must all be able to use digital information and digital methods competently and responsibly across all areas of the University, from our research to the structures that underpin it. This is why Universität Hamburg pursues a holistic approach to the digital transformation, which has yielded the uhh.digital strategy with various degrees of involvement from all relevant stakeholders. It consists of an overarching strategy and multiple sub-strategies for research, studies and teaching, and administration.

Our digital strategy is a central contribution to the future of Universität Hamburg for the benefit of science and research. Especially as flagship university, we seek to increase our international prospects with our comprehensive strategy while sustainably advancing and accelerating the digital transformation across the entire German academic community.

If we continue to approach the challenges posed by the transformation with curiosity and open minds, just as we have done over the past three years, I have no doubt that we will master this enormous step towards sustainable digitality at Universität Hamburg with flying colors.

Prof. Dr. Sebastian Gerling,
Chief Digital Officer der Universität Hamburg

UHH.digital

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01

Universität Hamburg's approach to digitalization

As well as being one of Germany's largest universities and one of its most productive research institutions, Universität Hamburg—a University of Excellence with around 44,000 students—is a modern knowledge organization hosting a wealth of research, teaching, and education. Today, this knowledge is primarily stored in digital formats, and digital tools are used to process it and pass it on. But there is much more to digitalization[1] than the digital representation of information and its processing through digital methods: in the sense of a synergetic interaction of analog and digital media, digitality has long become an inherent component of studies, research, teaching, learning, living, and working at Universität Hamburg. Especially in light of the insights gained during the coronavirus pandemic, a comprehensive strategic and visionary investigation of the complex topic of digitalization is urgently needed for the future and direction of the University itself and of Hamburg as a center of knowledge and research. The 2028 Digital Strategy seeks to fill this gap.

[1] Initially, the concept primarily revolved around converting analog into digital information (digitization); later, this focus shifted to the integration of this digitized information into efficient processes (digitalization). Since then, we have come a step further and now seek to implement new ideas made possible by the former two steps (digital transformation). Rather than replacing everything analog with something digital, digitality aims to connect the po-tentials of both worlds carefully and on the basis of real-life needs, effectively combining human productivity with technology.

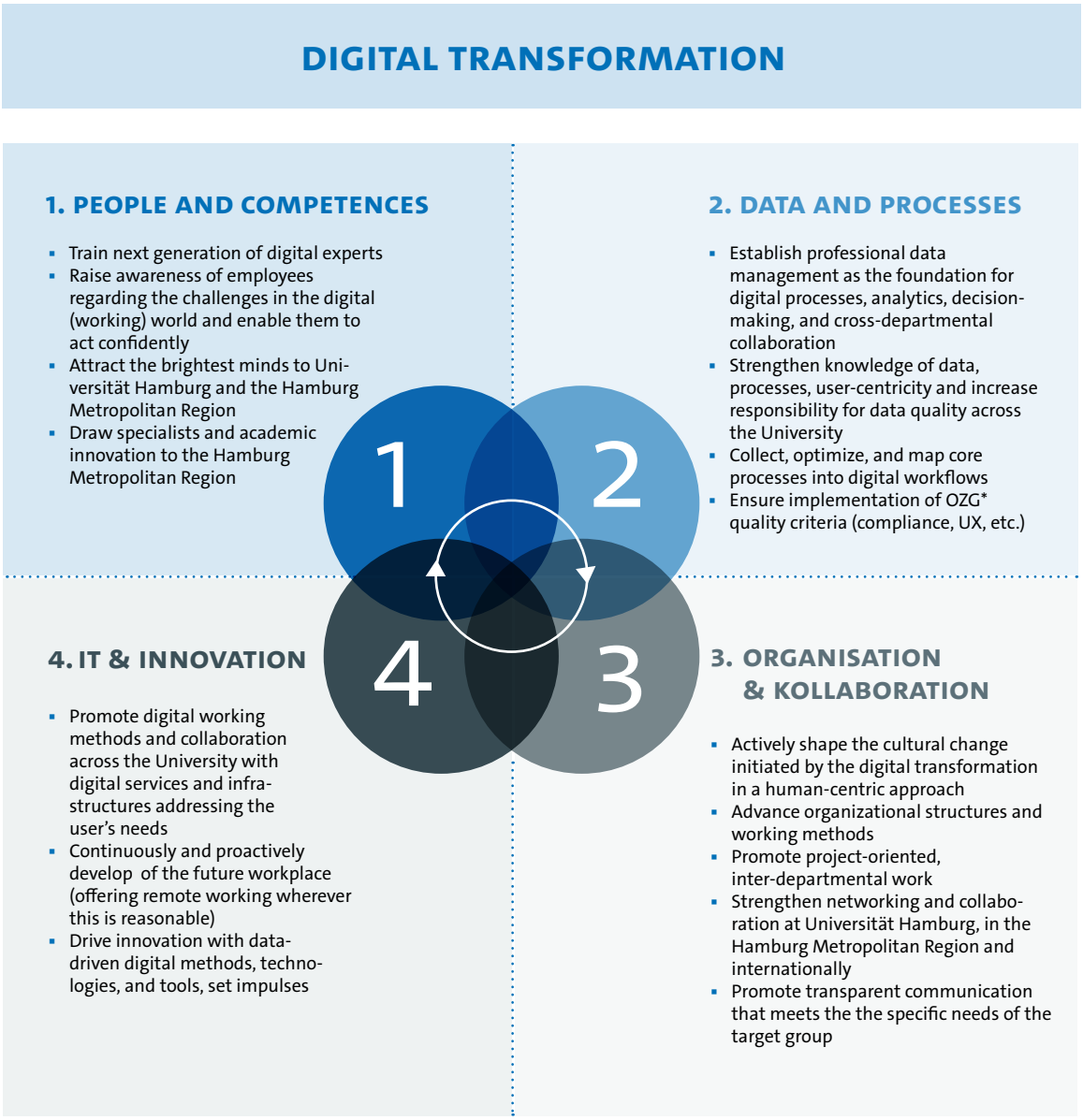

FIGURE 1 UHH DIMENSIONS OF DIGITAL TRANSFORMATION. *OZG = ONLINE-ZUGANGS-GESETZ

ACCESSIBLE FIGURE DESCRIPTION ON PAGE 63

Dimensions of digital transformation at Universität Hamburg

At Universität Hamburg, we approach digitalization in the sense of a digital transformation: a complex technological and cultural change process that incorporates the entire University with all its activities—research, studies, teaching, knowledge exchange, and administration—and its members. This process constantly affects, and is constantly affected by, our university environment. It enables Universität Hamburg, a Flagship University, to become a driving force and co-creator of the digital transformation in the Hamburg Metropolitan Region, its institutions and administrative structures. Our university-wide target of a successful, holistic digital transformation comprises four interlocking dimensions (cf. Figure 1): (1) data and processes, (2) information technology (IT) and innovation, (3) organization and collaboration, (4) people and competences. These four dimensions of digitalization reflect the goals and activities of the digitalization strategies launched by the Ministry of Science, Research, Equalities and Districts and the Free and Hanseatic City of Hamburg and others, such as the regional innovation strategy with its future visions of data science and digitalization.

Universität Hamburg's 2028 digital vision: UHH.digital

Digital transformation is not an end in itself. Rather, it is a creative tool, a lever, an engine and a catalyst for implementing the guiding principle of the University's excellence strategy: *"Innovating and Cooperating for a Sustainable Future."* Universität Hamburg's digital vision takes into account the complex, frequently ambivalent relationship between the two great transformations of our time: the digital transformation and the sustainability transformation. At the same time, the broad topic of digitalization and digital transformation constitutes a subject of interdisciplinary research and knowledge exchange in itself. It is concerned, for example, with the development of new technologies and modern, data- and design-driven research methods and models, with their broad application and comprehensive transfer, and with the effects of digitalization.

Our university-wide digital vision, which complements and expands the existing guiding principle, is as follows: **"Driving and Enabling Innovation and Cooperation for a Sustainable Future in the Digital Age."** Among its other goals as a flagship university, Universität Hamburg aims to drive and shape the digital transformation of the entire metropolitan region in the fields of society, education, culture, economy, and politics.

Digitalization as a cross-sectoral strategic dimension at Universität Hamburg

Within the scope of the strategic planning processes carried out in preparation for our application for the second funding line of the Excellence Strategy of the Federal Government, the development area of digitalization has been strategically aligned with all sectors of the University in a collaborative endeavor. Prior to this effort, digitalization projects had been launched on a selective, generic basis. Having

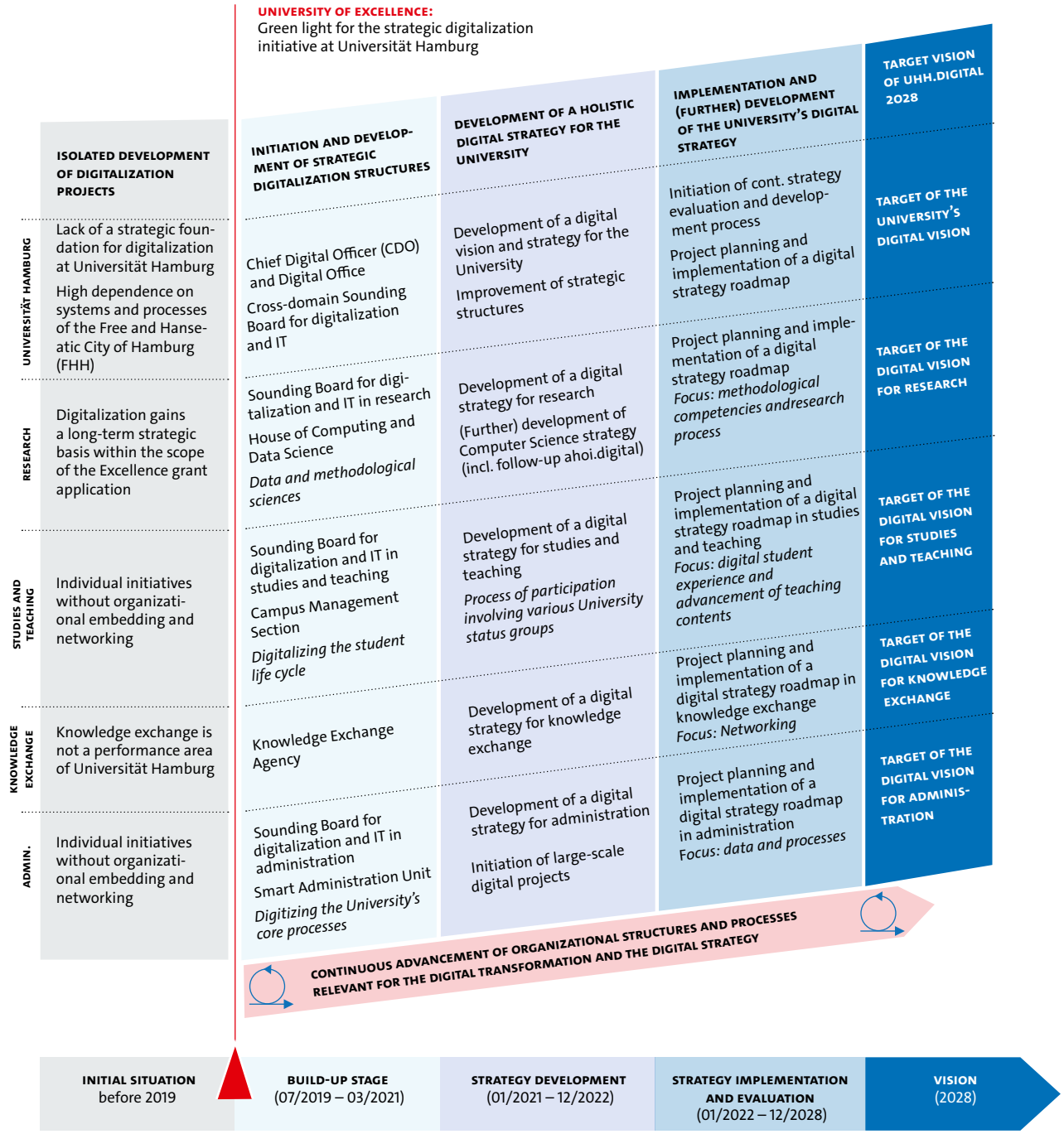

FIGURE 2 DIGITAL-STRATEGISCHE ENTWICKLUNGEN AN DER UHH

ACCESSIBLE FIGURE DESCRIPTION ON PAGE 64

been awarded the status of a University of Excellence and received the attached funding, the University was able to implement the first of many far-reaching strategic initiatives aimed at establishing comprehensive organizational structures for the digitalization project. The present Digital Strategy was developed on these structures. All area of activity and measures defined within it constitute the foundation of a corresponding strategic implementation road map. Today, digitalization is one of the central, cross-sectoral strategic dimensions of Universität Hamburg, alongside communication, sustainability, internationalization, equal opportunity, and talent.

The following diagram (cf. Figure 2) illustrates the current state of the digital and strategic developments in their chronological and institutional context. It also shows the holistic approach underlying the strategy, which reflects the multidimensional strategic concept[2] of Universität Hamburg: As well as the three strategic performance areas—research, studying and teaching, knowledge exchange—the Digital Strategy involves special consideration of the area of administration or rather service and support.

The strategic process aimed at developing a holistic digital strategy for Universität Hamburg, including the corresponding strategies for the University's three performance areas of research, studies and teaching, and knowledge exchange plus the area of administration, was initiated in 2021. The departmental sounding boards for digitalization and information technology (in research, studies and teaching, and administration) are responsible for this process; they are coordinated by the Digital Office in collaboration with the head of administration and the respective vice presidents of the Executive University Board. In this strategic development process, the involvement of representatives of various target groups at the University varied by area. The digital strategy for the area of knowledge exchange is an outlier, as this topic is strategically relevant at the cross-sectoral level and as an independent performance area. It therefore strongly relies on developments in the other strategies. As a result, the newly established Knowledge Exchange Agency only began to develop the strategy in the summer of 2022. This process will conclude with the establishment of the knowledge exchange performance area in 2023.

The pandemic-induced acceleration of the digital transformation has resulted in far-reaching changes and challenges across all areas of Universität Hamburg and, above all, encouraged fundamental reflection on its teaching and learning scenarios. Experience has shown that a binary distinction between "analog" and "digital," especially in the context of studies and teaching, is no longer sustainable.

[2] The strategic concept of Universität Hamburg, developed in 2022, comprises four dimensions: (1) governance and guiding principle: The overall strategic development of the University is based on its guiding principle, while the Uni-versity's governance provides the regulatory framework for the further development of the institution; (2) perfor-mance areas: research (including scientific infrastructure), studies and teaching, knowledge exchange; (3) cross-sectoral dimensions: communication, sustainability, internationalization, digitalization, equal opportunity, talent; (4) service and support: administration as the basis and foundation of the University, assisting science and scholarship and the performance areas with efficient services and support processes.

Instead, hybrid and fluid teaching, learning and living spaces are needed. As a university in which in-person teaching has always played an important role, Universität Hamburg now faces the complex challenge of reflecting on this principle in the context of the digital age while meeting the digitalization needs of students, teachers, the academic advising offices, and the examination management. The overall digital strategy for studies and teaching—as funded by the Ministry of Science, Research, Equalities and Districts[3] —has a special focus (cf. 3.2. Digital Strategy for Studies and Teaching).

Limits of digital transformation: conditions and conflicting objectives

The pandemic has also shown that goals and area of activity can rapidly change in the volatility of a VUCA[4] world. An appropriate strategic approach—especially in a technology-driven, high-momentum context such as that of digitalization—therefore requires structures that facilitate the continuous and iterative review, fast adaptation and rapid advancement of the digital strategy and digitalization project. From 2023, the development and advancement of the organizational and process structures set up to implement a continuous (agile) strategy process will constitute a fundamental building block of the strategy's realization.

However, the successful implementation of the digital strategy is not solely in the hands of Universität Hamburg. External conditions and developments, especially in the Hamburg Metropolitan Region, also play a decisive role. The strategic objectives set out in the present document require sufficient funds, staff, infrastructure and spatial resources. There is no savings potential in the successful realization of digitalization measures: it depends on reliable additional funding. In light of the current funding situation, Universität Hamburg will be unable to finance the planning of this project and the extensive investments needed for a comprehensive digital transformation (for example, the provision of modern technical infrastructure across the board) out of its own pocket. If the University is to be innovative and effective as a modern, knowledge-based organization, it requires favorable conditions that will allow it to retain its academic excellence and competitiveness at the national and international level. Universität Hamburg believes that the state government of Hamburg is jointly responsible for implementing these conditions in the areas of research, teaching and knowledge exchange, for establishing suitable administrative procedures, and for strengthening and fostering the appeal of Hamburg as a university city.

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[3] As per the requirements of the Ministry of Science, Research, Equalities and Districts and the Free and Hanseatic City of Hamburg, Universität Hamburg must develop a university-wide digital strategy by 2022. This strategy must take into consideration opportunities for digitalization in the field of teaching in order to facilitate the digital implementa-tion or support of new teaching and learning formats.

[4] VUCA stands for volatility, uncertainty, complexity and ambiguity. It describes the challenging conditions which or-ganizations navigate in the twenty-first century.

Not least, a far-reaching change such as digital transformation leads to numerous conflicting objectives—if only because the people involved in the change process are affected in different ways and perceive the change in their own ways. While some welcome the flexibility of space and time and the greater inclusiveness (gender equality, accessibility and inclusion in the sense of social sustainability) afforded by digitalization in the areas of studying, teaching, learning, internationalization, advising and work, others see a potential negative impact on physical and mental health, such as social alienation, constant availability, additional requirements, digital overload and overwhelming demands. Both positions are valid, as both stem from the needs and wants of university members. The launch, shutdown or redesign of digital tools and systems, processes and organizational structures are also met with different reactions across target groups. Digitalization, then, brings about many conflicting objectives. These should be approached in a conscious, appreciative and transparent manner to foster a corresponding culture and guide collaboration and communication across all areas of the University. Digitalization ought to be present where it is useful and beneficial, where it creates value and facilitates (international) collaboration and participation. Meanwhile, the culture of interacting and socializing in person will always remain at the core of our University's identity.

02

Universität Hamburg's digital strategy

As well as the individual digital strategies of the three performance areas of (1) research, (2) studies and teaching, and (3) knowledge exchange, the digital strategy of Universität Hamburg also incorporates the area of (4) administration. In addition, there are university-wide strategic objectives and areas of activity based on the University's dimensions of digital transformation (cf. Figure 1). The following section briefly explains these university-wide strategic objectives and areas of activity:

(Z1) Increasing institutional efficiency and effectiveness through professional data and process management

Digital information and data constitute the core and basis of digitalization and, as such, of digital processes and workflows. The latter facilitate transparent, flexible, and efficient collaboration, and they provide space for creativity, advancement, and innovation. To use these potentials, a professional data management system with a uniform data model (including a once-only principle, by which data are only entered once and then stored in a single location with suitable quality assurance provisions) and clear data ownership is required. On this basis, a professional process management system can be established, which will enable the University to capture existing processes or to set up and optimize new (in particular, cross-functional) processes and—where useful—convert these into digital workflows.

FIGURE 3 STRATEGIC GOALS AND AREAS OF ACTIVITY AT UHH

ACCESSIBLE FIGURE DESCRIPTION ON PAGE 66

(1) Further development and expansion of the data warehouse: Universität Hamburg's data warehouse (DWH) is a central data hub that makes administrative data from a various source systems available to all departments of the University in the form of reports, evaluations, analyses, and statistics consistently, reliably and with quality assurance measures in place. Interfaces synchronize the data with connected systems. The professionalized Master Data Management (MDM) manages central master data and makes them available. It operates on the once-only principle. The DWH and MDM, then, are the foundation of all central, data-based activities of Universität Hamburg's service and support units. As such, they should be extended and further professionalized on a continuous basis. This involves additional human resources and the expansion of the professional data management, including the connection of new systems.

(2) **Process platform and digital record:** The creation and expansion of the fundamental data management system runs parallel to the establishment of a technical and organizational environment that will enable them to be used in digital processes and automated workflows. As well as project management tools and a workflow engine, this includes the continuous expansion of the required internal areas of competence. It goes hand in hand with the introduction of digital records within the scope of the implementation of a document management system (DMS); these digital records will, in turn, constitute an important building block for the digital processes and partially automated workflows.

(3) **Professionalization of compliance structures:** Digitalization goes hand in hand with many compliance-related questions and requirements, such as data privacy and information security. To meet these requirements, the necessary supporting structures and competences at Universität Hamburg should be expanded and professionalized. This includes, for example, the (further) development of quality and compliance standards and guidelines for digital services (e.g., on user experience/UX, information security) and their establishment as a part of day-to-day work. It also requires the definition and optimization of processes and interfaces between the compliance units, such as data privacy and information securityt.

(Z2) Increasing the (international) appeal of Hamburg and boosting its competitiveness with modern IT infrastructure and digital structures for innovation and networking

Needs-based digital services and infrastructures actively promote working methods, collaboration, and networking both within the University and with external partners. Innovative, data-driven digital methods, technologies, and tools are driving forces for research, studies and teaching, knowledge exchange, and administration. With their innovative and methodological expertise, the members of Universität Hamburg make our city a metropolitan center of academic excellence with an appeal that extends far beyond the borders of Germany. They shape the sustainable digital transformation and innovation advancement of the Hamburg Metropolitan Region.

(1) **IT infrastructures, service portfolio, and support structures:** Powerful IT infrastructures are the basis for a successful digital transformation and the University's corresponding image. With the DataCenter concept for Universität Hamburg, featuring key DataCenter sites at Bundesstrasse and in the Science City Bahrenfeld (plus a third site omitted for security reasons), Universität Hamburg has already laid the groundwork for powerful IT infrastructures in future. The DataCenter at Bundesstrasse is already under construction. On the basis of these IT infrastructures for studies and teaching, research, knowledge exchange, and administration, a user-centric, very fundamental service and tools portfolio is needed to achieve the objectives of innovation and networking. This portfolio must meet the needs of stakeholders across all areas of Universität Hamburg and be able to facilitate and support internal and external collaboration through intuitive tools and lean processes as effectively as possible. At the same time, uniform and efficient support structures must be put in place alongside a similarly uniform, user-centric ticket system that ensures employees timely, targeted assistance in the event of any questions or problems.

(2) **UHH.digital platform and the digitalization map:** There are plans for the development of a virtual platform (UHH.digital) that will ensure the visibility of the University's digitalization competences both internally and externally and promote topic-specific collaboration within the University and with external partners. It will be designed to represent all relevant stakeholders, initiatives, and projects with a connection to digital transformation in research, studies and teaching, knowledge exchange, and administration alongside their respective functions, tasks, and research results. This is necessary, on the one hand, for identifying collaboration partners and networking with them and for promoting interdisciplinary research; on the other hand, it helps Universität Hamburg present itself to external stakeholders from the spheres of academia, politics, business, and society by allowing it to communicate research results, engage with topics of knowledge exchange and, in the same context, identify suitable contacts. The platform further provides the data basis for a systematic survey of key indicators, which enable the management of Universität Hamburg to carry out continuous monitoring activities and strategically control the development of the field of digital transformation at the University.

(Z3) Strengthening interdepartmental networking and collaboration through organizational development, digital collaboration solutions, and digital and transformation projects

Digital transformation also transforms the ways in which we communicate and work. In particular, it requires intensified project- and process-based working and thinking, often across organizational units. The opportunities offered by digital communication and collaboration tools support and promote this. With their assistance, the University seeks to establish a culture of transparent communication, strengthen internal networking, and successfully implement interdepartmental digital and change projects.

(1) **Social intranet and collaboration platform:** Transparent communication is a quintessential factor in the success of interdepartmental projects and a strong company culture, especially in the age of digitalization. Based on the requirements and demands of Universität Hamburg's members, an internal communication platform (social intranet) for specific topics and target groups (e.g., using information channels) will be launched. It will be supplemented by a digital platform for collaborative work within the University and with external partners.
(2) **Organizational structures and professional project/change management:** IT and digitalization projects pose many challenges. Most such projects involve various units within the organization. As a result, projects and processes have multiple interfaces between departments and units. To realize these projects successfully, they must be consistently based on business processes; they must be planned and carried out with an interdepartmental perspective and the corresponding approach to organization development; and they must ensure that all employees develop the required competences. Ideally, those in charge possess the necessary expertise in the fields of

requirements analysis and process/project management, plus capacities and powers beyond the line positions. Alongside the establishment of project management and chance competences (cf. Z4), a new "digitalization competence pool" of experts in the field of digital and change projects will be created. This pool will also include project managers who implement interdepartmental projects outside of the line organization.

(Z4) Recruitment and qualification of digitally competent, change-driving professionals through targeted measures

Heightening international competition for the brightest minds, volatile conditions, and the rapid development cycles of modern technologies require organizations to adapt extensively and quickly in order to react flexibly to sudden changes and new developments and remain able to do so in the long term. To a great extent, Universität Hamburg's ability to meet these requirements depends on the people who shape and run our institution: the employees, teaching staff, and researchers. As such, it is one of the key objectives of our comprehensive digital strategy to (further) qualify our members for independent change management activities in the digital age and the recruitment of digitally and technically competent experts.

(1) **Competence development in IT, digitalization, and change:** A university-wide qualification and professional development service is planned as a means of ensuring the competence and capability of University members in a rapidly changing digital world. Especially in the context of digital transformation and the corresponding organizational development, employees must be in a position to keep up with ongoing changes and contribute to them. As well as introductory courses for all employees, this also requires in-depth courses aimed at specific target groups, disciplines, and roles, plus a corresponding managerial development program. The competence portfolio is as important as organizational changes in achieving effective and efficient digital transformation, and its establishment is a time-sensitive project.
(2) **Recruiting experts in digitalization and IT:** To protect Universität Hamburg's competitiveness and excellence in (international) higher education, a comprehensive expert recruitment strategy in the competence area of digitalization and IT is to be developed. This will involve, for example, the evaluation and assessment of alternative remuneration strategies in order to recruit qualified IT experts, the exploration of opportunities for further flexibility at work (e.g., permanent remote-working within and beyond Germany), the evaluation and design of development opportunities and career paths for people from different professional backgrounds, and the development of concepts and measures for optimizing the University's training routes so as to entice students into a career at Universität Hamburg at an early juncture. In addition, the University seeks to establish a pool of digitalization experts containing qualified professionals from the fields of requirement management, UX and service design, project and process management, and software development who will oversee the implementation of digitalization across the University and provide advice.

(Z5) Addressing the cross-sectional topics of internationalization, sustainability, equal opportunity, and (digital) accessibility consequently

Within the scope of its digital transformation, Universität Hamburg pursues international visibility and competitiveness across all areas: research, studies and teaching, knowledge exchange, and administration. In the context of digitalization, in particular, sustainability plays a very important role. On the one hand, it is relevant to the technologies, hardware and services used, including their sustainable operation; on the other hand, it is also a factor in the conceptualization of a long-term vision and in digitalization as an interdisciplinary research subject in its own right. The intensified use of digital technologies calls for the sustainable use and planning of the associated resources. At the same time, digitalization is the solution to many sustainability challenges. The opportunities it offers facilitate more flexible, location-independent working models; they make it easier to reconcile work and family life; they support diversity and, in conjunction with (digital) accessibility, the inclusion of a wide range of stakeholder groups. Individual approaches to these aspects feature prominently in all cross-sectoral digitalization topics, and they are also the subject of the individual strategies developed for said topics.

03

Digital strategies for research, studies and teaching, knowledge exchange, and administration

The present digital strategies for (3.1) research, (3.2) studies and teaching, (3.3) knowledge exchange, and (3.4) administration are the result of a participatory strategy process implemented across the University. All digital strategies[1] are structured as follows:

- Preamble: Placing the department-specific digital vision in its specialist context
- Digital Vision 2028: perspective(s) for the institution and its specific target groups
- Strategic digitalization objectives and areas of activity

The digital visions developed within the scope of the strategy process present department-specific objectives to be implemented across Universität Hamburg by 2028. To support the overarching strategic perspective, the deans' offices are invited to develop faculty-specific and subject-specific digitalization measures and projects in line with the general goals and areas of activity of the digital strategy, taking

[1] The digital strategy for knowledge exchange will be developed further in 2023 based on the present structure.

into account the cultural heterogeneity of the disciplines and the needs and demands of their members. The individual departments and units of the University Administration and the central institutions of Universität Hamburg, too, are responsible for developing digital concepts that reflect their subject-specific priorities in the digitalization context.

3.1 DIGITAL STRATEGY FOR RESEARCH

3.1.1 Preamble

Research, support for doctoral and early-career researchers, and knowledge exchange all take place in a dynamically developing world that is increasingly molded by digitalization. In the former field, digitalization is a particular challenge: it needs to support all areas of research—especially top-level research—while being a diverse research subject in its own right, both at the interdisciplinary level and within the core disciplines. Digitalization also has major impacts on support for doctoral and early-career researchers and on knowledge exchange, both at the content and structural level.

With growing volumes of data and more and more methods of utilizing these data, digital transformation influences research processes, methods and subjects equally. Because research is primarily based on digital data, digitalization of research particularly involves automated data processing. Depending on the discipline, there are considerable differences in the quality, format, and scope of available data, so that their storage and processing require individual solutions.[2]

One of the greatest current drivers of innovation is the area of informatics with a focus on data-driven research fields, such as data science (DS), artificial intelligence (AI), machine learning (ML), and scientific computing (SC). Due to the expanding availability of digital data collection and analysis methods, open-science platforms and the development and expansion of professional research data management (RDM) and high-performance computing (HPC) are extremely important. While they offer great (innovative) potential for researchers, they also require these researchers to adapt flexibly and rapidly to changing structures. The relevance of these developments is also reflected in the priorities set out by the German Research Foundation (DFG), which has identified three key topics—AI/ML, RDM, and digital transformation—as quality criteria for excellent research in the digitalization context.

The utilization and development of digital methods and tools for data collection, storage, analysis, processing, and visualization require powerful, reliable and project-specific IT infrastructures and competent support systems and services. As well as hardware and software resources, these infrastructures must include a capable data network for internal and (occasionally data-intensive) external collaboration with partner institutions worldwide. Other basic requirements are methodological and IT competences for all

[2] Digital data can occur naturally (e.g., as a result of citizens' online activities), be collected scientifically in the context of large-scale experiments (e.g., in the Large Hadron Collider, LHC) or be entirely synthetic (e.g., created during extensive simulations). This heterogeneity and volume clearly illustrates the importance of professional research data management and high-performance computing.

researchers (digital sovereignty, data and digital literacy etc.), which should be taught within the scope of a science-driven training and qualification portfolio.

At the same time, digitization brings many socio-cultural, ethical, and privacy challenges with it. Ethics in the context of digitalization and information technology is an increasingly important topic, which focuses on the social, ecological, and economic effects of digital activity. Guidelines and standards for digital ethics, which take new moral concepts such as data bias[3] into account without neglecting tradition, culture and scholarship, make digital ethics a paramount topic for researchers. Those who handle large and complex data volumes, in particular, must be sensitized to issues of data privacy. In this way, data privacy, digital ethics, and digital responsibility are closely interconnected.

Digitalizing research at Universität Hamburg

Universität Hamburg is aware of the importance of digitalization in research. It already addresses this in its research activities, services, and infrastructures. As a research university, Universität Hamburg exhibits a high level of heterogeneity in its representation and processing of knowledge. All departments have different interfaces and requirements in the digital methodological sciences (primarily informatics and mathematics) with a focus on DS, ML, and AI. In order to address this heterogeneity appropriately, a capable approach to informatics is needed. This model must advance key research subjects (such as the field of cognitive systems) while simultaneously driving the further development of methods and their transfer across all areas.

In light of this, Universität Hamburg has set out the following priorities for its digitalization efforts in the fields of research, research support, and support for doctoral and early-career researchers:

(i) Research and advancement of digital methods and systems (digital methodological and basic research in theoretical and applied informatics and mathematics)
(ii) Utilization of digital research methods across all specialist subjects (applied, interdisciplinary research)
(iii) Research into the effects of digitalization on people and society (meta-level research)

Areas (i) and (ii) mutually influence each other: new methods such as deep learning find application in the specialist subjects, while said disciplines also identify new requirements which trigger the development and improvement of digital methods. This is not limited to informatics and mathematics. It may occur at the interdisciplinary level between methodological and specialist subjects. The use of digital tools must also take considerations from area (iii), such as ethical questions,[4] into account. There is also a need for structures that support the digital transformation of the research process (in the sense of replacing

[3] Especially the development of ML models frequently utilizes training data that have unintentional biases; this can, for example, lead to discriminatory decision-making. Current research seeks to detect and prevent such problems.

[4] Universität Hamburg has, for instance, appointed faculty-internal ethics commissions for this purpose.

analog methodological approaches and information with corresponding digital alternatives and facilitating entirely new approaches). At the cultural level, digital transformation in research acts as a catalyst for networking, interdisciplinarity, internationality, collaboration, and knowledge exchange. This has been confirmed by various projects, such as the interdisciplinary Data Science in Hamburg Helmholtz Graduate School for the Structure of Matter (DASHH), the interdisciplinary House of Computing and Data Science (HCDS), the cross-institutional Hamburg-X Project Center for Data and Computing in Natural Science (CDCS), and the University's collaboration with the German Climate Computing Center (DKRZ).

To protect the University's excellence in the face of intense international competition, various discipline-specific and research-specific digital requirements must be taken into account when planning and developing the research environment at Universität Hamburg. A modern, comprehensive, and powerful digitalization portfolio comprising all three areas of activity is an indispensable requirement for excellence in this day and age. It is evaluated as a quality criterion for the appeal of Hamburg as a university city and for the University's attractiveness as an employer, and it directly influences the University's reputation and its ability to recruit and retain excellent academics.

Structures for digitalization in research

Universität Hamburg has established central structures and (support) services to address digital requirements in research. They are complemented by corresponding facilities in the faculties and the core areas of the digital methodological sciences.

» **HCDS as a flagship facility for data science, AI, and ML at Universität Hamburg:** Established in 2021, the House of Computing and Data Science (HCDS) works at the interface between the digital methodological sciences and the specialist subjects. As a central facility, it assists the establishment of priorities i–iii across the University. At the Method Competence Center (HCDS-MKZ), it helps researchers develop digital methodological skills using scientific engineering and, for example, supports them in applying data science across all departments. Temporary cross-disciplinary labs (CDLs) are a platform for discussing digital methods within the specialist subjects, for researching digital methods and subjects in an interdisciplinary manner, and for testing the results across subjects. By processing the latest DA and ML methods and technologies at the interface between CDLs and MCC, the HCDS contributes substantially to the continued use of these digital methods in research and knowledge exchange. The blueprint for the CDLs was the CDCS project, launched in 2020 under the name Hamburg-X, which successful implemented four CDLs in the natural sciences (astro- and particle physics, photon research, system biology and accelerator physics) in collaboration with Deutsches Elektronen-Synchrotron (DESY) and the Hamburg University of Technology (TUHH). The CDCS also illustrates how CDLs can be organized and set up inter-institutionally, in the context of the HCDS and further partner institutions. In addition, the HCDS is a driving force of networking activities with a focus on digital methods both within the University and with external partners.

» **Digital methodological sciences (Departments of Informatics and Mathematics):** Informatics and mathematics are the core of the digital methodological sciences,[5] which research the basic methods in the entire breadth of their respective disciplines and complement them through links with the research disciplines. In particular, the cross-sectoral topics of DS and AI are relevant to and still underrepresented across all subjects. To ensure sustainable exchange and synergy on digital methods within the University, a strong informatics department that sets its own focal points in basic research is of particular strategic interest.

» **Digital application sciences (all disciplines):** Temporary professorships are a necessary component in the successful digitalization of research across all subjects. This requires specialists who have both mastered their own research subject and possess extensive expertise in the methodological sciences. Various existing professorships in the economic sciences illustrate this model (e.g. Data Science, Information Systems and Digital Innovation, Digitized Communication and Digital Markets), the life sciences (Center for Bioinformatics), chemistry (Computational Chemistry), and physics (Machine Learning in Physics). By appointing corresponding research groups, competences in the core areas of DS, AI, and ML can be established gradually.

» **Interdisciplinary graduate schools (DASHH):** Graduate schools at the interface between applied disciplines and methodological sciences constitute an optimal catalyst for knowledge exchange with the research subjects. Collaboration between researchers from the applied fields with computer scientists and mathematicians yields innovative, tailored methods and, in particular, a culture of promoting talented early-career researchers interested in digital methods. The Helmholtz Graduate School DASHH, jointly operated by DESY, Universität Hamburg, the Hamburg University of Technology (TUHH) and six other partners has already improved the interconnectedness of the subjects markedly—an important contribution to the Hamburg Metropolitan Region.

» **The RDM as a central port of call for research data and information:** Universität Hamburg's Center for Sustainable Research Data Management (RDM) helps manage the continuously growing volumes of data used in research. The RDM pools, stores, and digitizes research data for their entire life cycle and in consideration of the FAIR data principles.[6] Its service portfolio covers the entire breadth of RDM, from consultancy and competence development (relevant as early as the application stage) to database-building and long-term storage of research data. The Research Information System (FIS), also a part of the RDM, helps to collate individual research results. It supports, for instance, exchange and information for researchers and efficient reporting and representation of research on websites..

[5] In addition, many areas explore algorithmic methods, such as the business and social sciences, e.g., communication and marketing, politics and media, and digital transformation in entrepreneurship.

[6] FAIR data principles stands for findable, accessible, interoperable, and reusable.

» **The RRZ as a modern IT service provider for needs-based infrastructure solutions:** The Regional Computing Center (RRZ) is in charge of providing the basic digital infrastructures to ensure smooth processes and ensure professional operations of the highest standards for research. Simultaneously, the RRZ is an IT service provider offering Universität Hamburg a comprehensive portfolio of support services and making modern HPC clusters available for research activities.

» **E-science offices as a faculty-specific support structure:** On top of the central services, the faculties incorporate their own, decentralized institutions, such as the e-science office in Educational Science, which offers specific digital services, carries out consulting activities (e.g., on data protection) and provides support on subject-specific requirements in the research process. Based on this model, additional faculties should operate their own e-science offices, which would serve the purpose of a liaison and multiplier between the central institutions (HCDS, RDM, RRZ) and the researchers in the faculties.

Prerequisites for digitalization in research

As well as establishing new structures and advancing existing ones, the methodological sciences (such as informatics) must be strengthened sustainably in order to achieve a holistic digitalization at Universität Hamburg that satisfies the requirements for digital knowledge management and meets the extensive challenges posed by digital transformation and the digital transition in academia. This transformation and reprioritization requires an enormous amount of resources. The University cannot do it alone, especially not in the time available. Additional external funding, primarily from the Free and Hanseatic City of Hamburg, will be needed to realize the vision described below, which is essential to the evaluation of the Excellence Initiative.

3.1.2 Digital vision for research

As a place of excellent research, studies and teaching—including support for doctoral and early-career researchers—and knowledge exchange, Universität Hamburg utilizes and examines the opportunities offered by digitalization across the entire breadth of the University. It perceives digital methods and competences as an important tool for its own continuous development. The various research areas and their members have very heterogeneous requirements, and all perspectives must be taken into account when implementing digitalization measures. As an institution, Universität Hamburg (1) provides the framework for excellent research, in which the clusters of excellence and the research areas (2), and the researchers (3) operate.

(1) The perspective of Universität Hamburg as an institution

As an institution, Universität Hamburg seeks to stay abreast of the growing significance of digitalization in research. It creates the infrastructural, financial, personnel, cultural (organization, mindset, error culture, etc.) conditions needed to enable excellent research. Together with other research institutions from the Hamburg Metropolitan Region, the University establishes a modern and digitally outstanding research

environment with an international appeal. It collaborates with players from the spheres of business, politics, and society across the boundaries of its own institutions.

» By establishing the HCDS and further strengthening the areas of AI and DS in the digital methodological sciences and the disciplines themselves, Universität Hamburg provides the framework needed for incorporating digitalization into all research subjects. All researchers will receive continuous support in both the research process and the development of their research topics in the field of digitalization. CDLs will be set up to advance interdisciplinary research topics at the interface between the methodological sciences and the specialist subjects. These CDLs are organized collaboratively at the HCDS and within the scope of projects (e.g. CDCS); through the mutual exchange of methods, they collaborate to the overall advancement of the digitalization endeavor.

» The Free and Hanseatic City of Hamburg develops and plans the concept of the Science City Hamburg-Bahrenfeld (SCHB) together with the academic and research institutions of the Hamburg Metropolitan Region. Universität Hamburg supports this vision of the future with its own specializations, such as the HCDS, the concept of the digital natural sciences, and the CDCS. Its goal is to work with partners within the SCHB to create a focal point at the interface between the digital methodological sciences and the specialist subjects (in particular, the natural sciences).

» In its organizational and decision-making structures, Universität Hamburg supports and prioritizes the realization of its digitalization plans by assigning clear responsibilities. It takes the affected status groups and their needs into account when planning the digital transformation and ensures appropriate opportunities for participation. By interlinking centralized and decentralized structures, it guarantees the science-focused, needs-based further development of the digital structures and services.

» With the Regional Computing Center (RRZ), Universität Hamburg operates a modern and innovative IT service center that provides researchers with science-focused, modern and secure (digital) infrastructures. This includes, for example, flexible experimental labs that can be made available at short notice with digital administration and booking options. Collaboration opportunities and synergy effects in the provision of basic services are reflected at the regional, European, and international level. This process appropriately accounts for the need for digital sovereignty.

» Tailored to the various relevant functions and requirements, Universität Hamburg provides the space and technology (hybrid working environments, array of tools) needed to use and develop digital research methods in a modern environment. It facilitates intuitive internal and external collaboration by means of user-friendly digital tools. The University ensures that the software requirements of research projects are met without delay. Digital tools, systems, and processes reduce administrative efforts, facilitate the organization of work, and free up space and time for research.

» Universität Hamburg provides a comprehensive, needs-based array of support services for every stage of the research process and offers advice on questions arising in the context of digitalization (e.g., data

privacy, compliance, ethics, etc.) throughout all project phases. In the form of the HCDS-MKZ and the RDM, it offers a wide range of further services relating to digital methods and research data, all carried out by qualified experts. This contributes to the digital transformation of the sciences:

- The HCDS-MKZ supports the early availability of data-driven methods across all disciplines. In particular, it ensures easy access to these methods. In addition, it offers needs-based advising and implementation services, including help with implementation, the selection of appropriate hard-/software, and methods and compliance questions. Close networking with all departments, the clusters of excellence, and the triad of collaborative research forms creates synergies and helps identify overarching needs.
- The RDM provides extensive support with research data throughout all project phases. Its objective is to assist researchers by means of digital tools, which simplify their work, for example, by automating data flows. The RDM further provides secure data storage solutions, including methods of access for external research partners, which is particularly relevant in the case of highly sensitive data from medicine, psychology, and the educational sciences, which involve maximal data protection and compliance standards.

» Universität Hamburg offers a comprehensive portfolio of training and professional development opportunities in the fields of digital and methodological competences that is geared to the different needs of the various target groups, for example, in terms of their level of experience (early-career researchers, professors) and their specialist disciplines (informatics-adjacent vs. non-technical). This enables researchers from all backgrounds to use digital methods and standards confidently, support open science, and take advantage of the opportunities afforded by digitalization in research. In its support for doctoral and early-career researchers, Universität Hamburg starts at the undergraduate level by incorporating data skills in the degree programs of all faculties. The qualification catalog further comprises professional development formats on soft skills in the context of modern approaches to work.

(2) The perspective of the clusters of excellence and the triad of collaborative research forms

Within the scope of the Excellence Strategy of the Federal and State Governments, Universität Hamburg has been awarded four clusters of excellence, which have been funded by the German Research Foundation (DFG) since 2019: CUI: Advanced Imaging of Matter (photon and nanosciences); Climate, Climatic Change, and Society (CLICCS) (climate research); Understanding Written Artefacts (manuscript cultures); and Quantum Universe (mathematics, particle physics, astrophysics, and cosmology). These clusters of excellence represent four of the University's core research areas. There are many other collaborative projects, which are strategically organized within a triad of collaborative research forms. All these research alliances carry out international top-level research and continuously advance the University together with the faculties and departments. The digital transformation of academia and the organizational structures and infrastructures it brings with it optimally support the establishment and advancement of the triad of collaborative research forms. They are fertile soil for developing new core research areas.

» The processes of pooling expertise in the HCDS and, at the specialist subject level, in the research alliances are closely interlinked; collaborative development leads to productive exchange and the development of new collaborative grant applications at all levels. Availability of the latest technologies is indispensable for the research carried out in the clusters of excellence, which play a key role in defending Universität Hamburg's status as a University of Excellence.

» Many alliances utilize digital solutions in their research activities, e.g., for modeling and simulations. This results in high capacity requirements for storing and processing data.

» It is expected that the most innovative research will take place at the interfaces between the traditional disciplines in future. This is where appropriate tools will be needed, and different departments usually use digital solutions.

(3) The perspective of researchers

As key drivers of all research activities, academics actively influence the University's research profile. When it comes to matters of digitalization, researchers from different backgrounds—specialist discipline, research area, use of scientific (and data science) methods, experience, and personal affinity for digital technologies—have individual requirements. These must be taken into equal consideration and accounted for when planning, developing and improving services.

» Universität Hamburg provides researchers with an attractive environment for their work. It offers a modern, powerful basic IT infrastructure, digital applications for research and collaboration, and the fast and flexible provision of needs-based, supervised digital solutions for concrete research contexts and projects. Researchers are given the accounts and licenses needed to access publications and other resources.

» They are open to new trends and key technologies, such as DS, AI, and ML, and engage with ways of utilizing them in the context of their research questions. From the first application to the regular use of digital methods, the University offers excellent conditions and support—for instance, the support and advice structures of the HCDS-MKZ—for any level of experience and any type of scholarly project.

» Researchers are experts in their domain. Those who need to use digital methods either possess the corresponding competences in digital methods or they have suitable opportunities to advance their knowledge on a continuous basis within the scope of the digitalization process. These competences comprise research-related IT and digital skills (e.g., application of DS methods), interdisciplinary knowledge (e.g., basic understanding of data protection, ethics in the digitalization context), and soft skills (e.g., leadership in hybrid settings, digital networking). To acquire them, researchers have access to qualification programs, exchange between colleagues, and their intrinsic motivation as researchers.

» When researchers use DS methods and digital applications in their research or further develop digital methods, they are given adequate support for handling any ethical and legal issues (data protection, bias etc.) that may come up in the digitalization context and assess the impact of their digital work on people and society. The corresponding support structures are readily available. With help from the faculties' ethics commissions, researchers can reflect on their projects, assess their ethical feasibility, and receive recommendations.

» They also have the opportunity of participating in the development and improvement of digital technologies, which allows them to play an active role in shaping digitalization (and, by extension, future social developments set in motion by digitalization and digital transformation). A researcher may decide to do this to satisfy their own educational needs or for the purpose of a specific project. Researchers enjoy the freedom to pursue their own academic interests and explore their own potential and creativity.

» They maintain their own data (publications, projects, prizes, activities, equipment etc.) in the Research Information System (FIS) of Universität Hamburg. Supporting digital tools (such as software agents) are available. With this process of data management, the researchers help the University meet its reporting duties while making an important contribution to the national and international visibility of the institution, which may lead to further networking in turn. In this way, the researchers contribute to the sustainable development of Universität Hamburg and lay the groundwork for further knowledge exchange.

» Researchers know that research is a fast-paced field of work. It is often competitive. In order to carry out research at the high level expected at Universität Hamburg, researchers demand suitable digital solutions allowing them to set new benchmarks and avoid falling behind in their highly competitive research environment. Universität Hamburg offers them digital infrastructures to support these processes at an appropriate speed and level of innovation.

3.1.3 Strategic digitalization objectives and areas of activity

The following objectives and areas of activity in the context of research digitalization are designed to guide the strategic development of research in the digital age (cf. Figure 4).

(Z1) Boosting research excellence and the city's academic appeal with digital methods and interdisciplinarity

Universität Hamburg seeks to be internationally visible and renowned as an excellent, high-performing, and attractive academic institution, especially in the fields of data science, AI, and informatics in general. Powerful and competitive methodological sciences (informatics and mathematics) and the continued development of comprehensively favorable conditions for integrational and interdisciplinary research at the interface between the methodological sciences and the University's major research disciplines are key

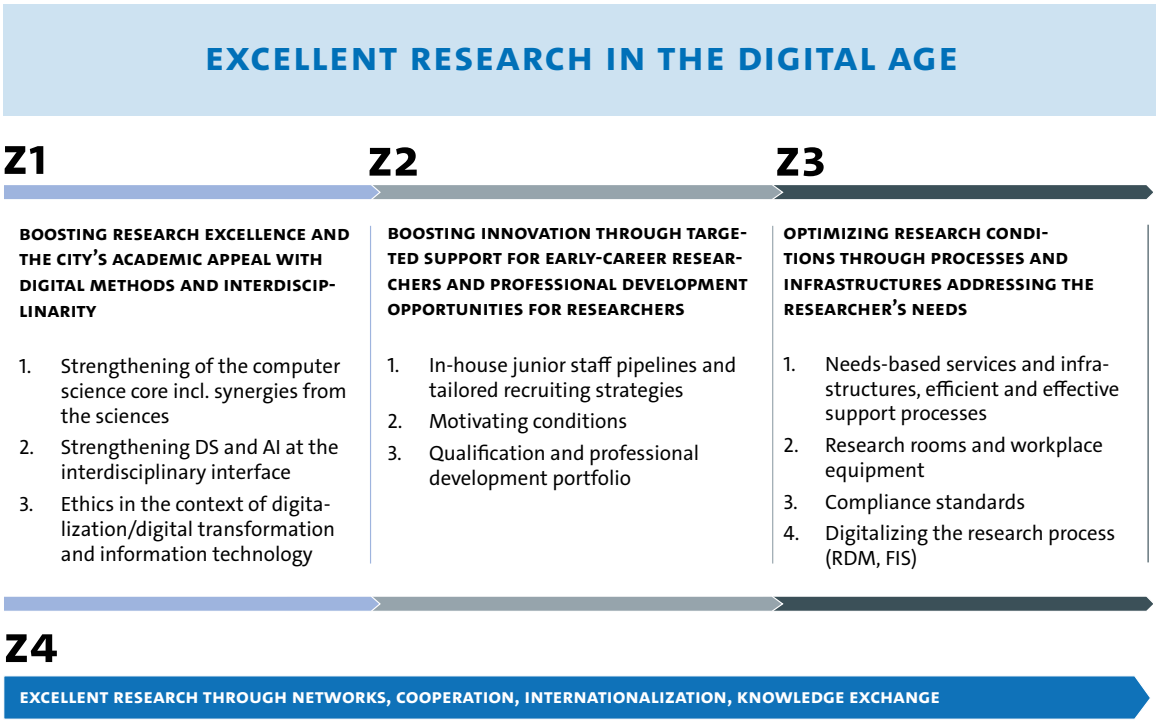

FIGURE 4 STRATEGIC GOALS AND AREAS OF ACTIVITY IN RESEARCH

ACCESSIBLE FIGURE DESCRIPTION ON PAGE 68

factors in achieving this objective, advancing the University, and protecting its excellence. The comprehensive establishment of digital methods and competences, including digital (research) ethics, in research and teaching is crucial for securing and developing the appeal of the City of Hamburg and the Hamburg Metropolitan Region as a place for business and research.

(1) **Strengthening of the computer science core incl. synergies from the sciences:** One of the greatest current drivers of innovation in digital transformation is the area of informatics with a focus on data-driven research fields, such as data science (DS), artificial intelligence (AI), machine learning (ML), and scientific computing (SC). A strong informatics department is an indispensable factor in the successful digital transformation of research and in the strengthening and continuous development of the University's potential. By appointing two flagship professorships and two additional professorships in the fields of DS and ML (at the moment, the Department of Informatics does not have any dedicated professorships in DS and ML), the University seeks to lay the foundation for method development and interdisciplinary research. It is currently evaluating the possibility of establishing temporary professorships for applied topics in DS/ML in the specialist subjects. In addition, Universität Hamburg is examining the option of establishing joint appointments with external research institutions and anchoring them in informatics (e.g., the CISPA Helmholtz Center for Information Security and the

German Research Center for Artificial Intelligence, DFKI) to strengthen the core methods and boost the University's competitiveness for external funding applications. Through these methods, the University seeks to develop informatics as a flagship discipline and significantly improve the related qualification options.

(2) **Strengthening DS and AI at the interdisciplinary interface:** The wide range of applications at the interface between the digital methodological sciences and the specialist subjects bears great potential for innovation. Universität Hamburg and its research partners are already in an excellent position in the specialist and applied sciences. In order to realize the full potential to be found at this interface, these collaborations must be strengthened in terms of digital methods and their application. The University plans to expand its interdisciplinary cross-disciplinary labs (CDLs) to this end, focusing on topics of digital innovation and business partners. A cross-institutional network involving partners from the Hamburg Metropolitan Region (Village of HCDS) will be established and expanded in order to initiate additional CDLs and facilitate networking.

(3) **Ethics in the context of digitalization/digital transformation and information technology:** (Research) ethics in the context of digitalization and information technology is of growing importance. Questions about data bias, discrimination, and data privacy, in particular, are relevant when handling large and complex data volumes, but digital activity also has social, ecological, and economic consequences. To support researchers grappling with these issues, the University will develop templates, guidelines, standards, support services and collate best practices in digital ethics, digital responsibility and compliance topics such as data privacy and information security.

(Z2) Boosting innovation through targeted support for early-career researchers and professional development opportunities for researchers

By establishing expertise in digital methods and digital approaches to teaching and supporting doctoral and early-career researchers, Universität Hamburg achieves its goal of training digitally competent professionals. The University is developing targeted recruitment and retention strategies aimed at excellent academics. This endeavor also includes qualification and professional development concepts which target specific groups across all experience levels and research disciplines.

(1) **In-house junior staff pipelines and tailored recruiting strategies:** In order to address excellent international early-career researchers, Universität Hamburg plans to work with an internationally renowned partner institution on advancing its informatics training program at the interface with the specialist subjects. Outstanding early-career researchers, in particular, will be able to engage in an exchange with the partner institution. The faculties are developing strategic measures for recruiting established talents and early-career researchers alike. This will particularly involve the optimization of the professorial appointment procedure.

(2) **Motivating conditions:** Excellent research requires a great deal of intrinsic motivation, creativity, and drive. Researching new topics is a time-consuming process. Universität Hamburg seeks to give its researchers more time for their actual work by digitalizing processes and services to make them more

efficient and user-centric and by providing suitable tools and infrastructure. It is further developing encouraging offers for researchers, taking into consideration that creative freedom, time, and funding are key to motivation. These offers include opportunities for participation, such as piloting modern approaches to work within the New Work project, the general topic of open science, funding for innovative research projects (e.g., within the scope of the CDL program), and learning labs for testing and exploring new, hybrid teaching concepts. The faculties are developing strategic concepts for retaining talented (early-career) researchers. In particular, this involves the development of an on-boarding process tailored towards each individual career stage.

(3) **Qualification and professional development portfolio:** Digital competences and digital methodological skills are essential in the labor market and in research. Aiming to develop digital competences in the context of new ways of working and digital methodological skills in specific target groups, both from disciplines that are adjacent to informatics and ones that do not involve data, the University is developing qualification and professional training formats tailored towards particular status groups and career levels.

(Z3) Optimizing research conditions through processes and infrastructures addressing the researcher's needs

The processes and infrastructures provided for research are constantly advanced based on the actual research process and in consideration of modern digital standards and intuitive usability so as to ensure optimal conditions for excellent research.

(1) **Needs-based services and infrastructures, efficient and effective support processes:** The availability of needs-based, reliable and secure infrastructure that includes research-focused services is an important prerequisite for excellent research. Universität Hamburg is strategically advancing this infrastructure, taking future technologies such as quantum computing into consideration. It is also evaluating possibilities of collaborative IT infrastructures and services in the Hamburg Metropolitan Region and at the national level in order to leverage synergies. Researchers are given the opportunity of using external services outside the basic options and infrastructures as needed so as to implement necessary solutions for their research quickly. A uniform digital support infrastructure and the corresponding support structures in the faculties are being developed jointly. The portfolio of services and support options available to researchers is being communicated and made available through a dedicated platform.

(2) **Research rooms and workplace equipment:** Digitalization raises new challenges in terms of (research) room and workplace equipment. Within the scope of the New Work project, new workplace concepts will be trialed in a participatory approach. Another key aspect of this project is the provision of experimental labs and innovation spaces for digital innovation and start-up endeavors.

(3) **Compliance standards:** Processes and structures in the field of compliance (in particular, IT compliance with a focus on data protection and information security) are under continuous development. This ensures quality support for researchers carrying out research projects at Universität Hamburg or collaborating with external partners and exchanging research datan.

(4) **Digitalizing the research process (RDM, FIS):** Most research is based on (digital) data. The volume of this data increases constantly, and digital data processing methods are used in more and more fields. Universität Hamburg continuously improves its research data management in order to support its researchers throughout the research process and the data life cycle, from collecting and storing the data to processing and archiving it. To facilitate research using sensitive personal data, Universität Hamburg provides secure storage solutions with access options for external partners. Another interesting approach in this context is citizen science, which involves data contributed by the public. Universität Hamburg is developing a concept for this field and initiating a platform for data exchange purposes.

(Z4) Excellent research through networks, cooperation, internationalization, and transfer

Networks and research collaborations with national and international partners strengthen Universität Hamburg's interdisciplinary research profile. The University aims to expand these partnerships in strategically relevant areas, such as informatics, or extend them to CDLs in the context of future topics. In addition, Universität Hamburg participates in initiatives such as the National Research Data Infrastructure (NFDI) and evaluates joint RDM solutions with partners from the Hamburg Metropolitan Region. By expanding knowledge exchange as a third performance area, the University seeks to strengthen the exchange of research results with business and society.

3.2 DIGITAL STRATEGY FOR STUDIES AND TEACHING

3.2.1 Preamble

The present digital strategy for studies and teaching is the result of a participatory strategy-planning process carried out at Universität Hamburg. It supplements and expands the Guidelines for University Teaching, developed in 2014, against the background of increasing digitality across all areas of society and the contextualization of studying and teaching in a digitalized world.

Universität Hamburg emphasizes that the adoption of the digital strategy for studies and teaching does not conclude this strategy-planning process: Rather, the present strategy is intended to initiate a university-wide discourse on the topic of digitality and digital transformation in studies and teaching. This process must involve the faculties, departments, subjects and all members of Universität Hamburg continuously and consistently in order to meet these groups' various requirements and demands as effectively and completely as possible. The present strategy provides a guiding framework for this process, which also involves the development of a strategic implementation plan.

Universität Hamburg's approach to teaching

Universities are respected places of research and teaching: Their education and knowledge exchange activities are a fundamental component of the advancement of society. It is their mission to promote and ensure education through their academic work. Universities must furnish students with a high level of academic skills and the ability to reflect and make sound judgments, become productive members of society, and take responsibility for its future viability.

Studies and teaching in the digital age

In the twenty-first century, studies and teaching take place in a world shaped by digitality. Digital transformation permeates all aspects of society, continuously shaping and reshaping science and scholarship, education, culture, business, and politics.

While digitalization in the strictest sense refers to the conversion of analog into digital media, its extended meaning describes changes that lay the groundwork for new approaches to existing activities, new ways of perceiving the world, and new ways of thinking (Stalder, 2021). The present strategy uses the word "digitalization" in this latter, extended sense. It also employs the term "digitality," which refers to the space of cultural opportunities created through the process of digitalization.

Students, today and in the future, grow up in this digitality. Technical innovation and rapid changes are an integral aspect of their reality and a normal part of life—before, during, and beyond their studies.

Universities are responsible for ensuring that their education meets the standards of the digitalized world in which it is provided. In concrete terms, students and teachers across all subjects and programs must be given access to expertise, methods, strategies, and infrastructures that allow them to navigate a constantly changing, heavily digitalized environment confidently and actively participate in its development.

The growing influence of digital tools, media, and platforms is putting the topic of digital literacy center stage, a concept aimed at enabling people to navigate digitality in academia and society in a well-informed, collaborative, responsible, and creative manner. Digital literacy comprises the technical and cultural skills required to find one's bearings in the digital world and actively contribute to its technological advancement. It also includes the element of critical reflection on the social, economic, political, legal, social, and cultural significance of digitality. This goes hand in hand with the equally relevant topic of data literacy: the ability to implement (digital) processes of data collection, storage, processing, analysis, and visualization paired with critical reflection on contemporary data practices and their consequences for day-to-day social participation in academia, politics, and business.

Hybrid learning spaces

As a forward-looking university in the digital age, Universität Hamburg seeks to gain a detailed understanding of digitality in studies and teaching. It pursues an integrated approach in which digitality is considered a component of teaching and learning scenarios. This approach deliberately rejects the dichotomy between "analog" and "digital" teaching: digitality in teaching implies hybrid learning spaces. The umbrella term "hybrid learning spaces" covers many ways of combining and blending physical spaces (lecture halls, seminar rooms, laboratories, libraries) with virtual environments (learning management systems, chat rooms, video conferences, cloud systems, apps, etc.) while integrating modern interactive technologies. Teaching and learning in hybrid spaces implies that on-site work can always be linked to digital work and that synchronous and asynchronous learning and teaching in virtual spaces does not take place in the absence of a corresponding physical location. These interrelations between virtual and physical elements in the teaching space facilitate innovation and expansion in studies and teaching across all subjects.

They also bring about greater didactic variety in teaching and examination scenarios, improved organizational resilience combined with the option of using learning and teaching offers more flexibly, and simplified (study administration) processes thanks to digitalization and new professional development services. This ensures that studies and teaching can be adapted as effectively as possible to the lives and needs of students and teaching staff.

Universität Hamburg strives for accessibility when developing and improving its hybrid learning spaces. The accessibility of material and virtual spaces is a key criterion of the digital strategy.

New areas of conflict

The conflicting objectives arising from digitalization are particularly significant in studies and teaching. Contradictions and tensions emerge, for instance, between innovation and freedom in teaching, between legal security and compliance when developing new teaching, learning, and examination scenarios, between personnel expenditures and flexibility in the implementation of courses, and between individualization and majority opinions when making decisions on matters pertaining to teaching and education. The design and use of hybrid learning spaces are not free from conflicting objectives, either. Increased flexibility and the freedom of students and teachers to make individual decisions can result in a decrease in social interaction and personal specialist exchange. All involved parties require a great deal of didactic sensitivity and personal responsibility to strike a good balance.

These tensions between the University's educational mission, the teachers' ideas, and the students' wishes cannot be prevented nor fully dissolved. The same is true for the tension between a scarcity of resources, on the one hand, and increased resource requirements to ensure appropriate management of digitality, on the other.

In light of these conflicting objectives, universities and their members strive to compromise transparently, weigh up the opportunities and risks, and develop the ability to make good judgments. The dynamic way in which universities and their environments are currently developing makes it impossible to formulate concrete guidelines for all possible scenarios. As a result, the joint ability to evaluate options and negotiate solutions is becoming more and more important.

A successful process of digital transformation requires investment as well as a desire for change. There can be no doubt: The digital transformation of studies and teaching does not come with savings opportunities. Instead, it requires reliable additional resources (cf. "Empfehlungen zur Digitalisierung in Lehre und Studium" by the German Council of Science and Humanities, July 2022).

3.2.2 Digital vision for studies and teaching

The development of a digital strategy for studies and teaching at Universität Hamburg is based on the holistic digital vision for teaching in the digital age. The latter integrates various perspectives: (1) the University as an institution, (2) teachers as guides and designers of learning spaces, (3) students as learners and co-designers of learning spaces. Digital tools and scenarios are to be used in a way that enriches studies and teaching. They should contribute to quality improvements, set good examples, and promote digital and data literacy.[11]

In the description of its digital vision and the development of its digital strategy for studies and teaching, Universität Hamburg also refers to the German Council of Science and Humanities' recommendations on digitalizing teaching and study (Empfehlungen zur Digitalisierung in Lehre und Studium) of July 2022.

(1) The University as an institution

As an institution, Universität Hamburg provides the framework for studies and teaching and implements the (infra)structural conditions in which students and teachers operate.

» The University holds a responsibility for good teaching and the corresponding reflection on educational objectives. To this end, it makes a high-quality range of consulting, support, and qualification programs available to facilitate the development and improvement of (innovative) courses and examination formats and the utilization of new methods and tools. Decentralized support structures ensure that specialist support is available when needed. At the same time, Universität Hamburg ensures the continuous, research-oriented, needs-based improvement of its services and ongoing quality assurance by interlinking decentralized with centralized structures.

» The University provides its teaching staff with motivating conditions (time, resources, support, and appreciation) that allow them to continuously develop and trial learning and teaching methods tailored to their own subjects (with a focus on special interdisciplinary and subject-specific digital and data literacy requirements), for example, with the objective of promoting digital and data literacy.

» Universität Hamburg makes comprehensive knowledge exchange, collaboration and networking opportunities available particularly to students but also teaching staff. This provides them with insights into current digitalization developments and challenges in specific occupations, such as academia and education, culture, business, and politics. The University has implemented the infrastructure needed for straightforward, smooth communication and collaboration in joint projects and cross-institutional (international) collaborations and networks.

» Within the scope of its partnerships with other universities, it offers an international program of virtual exchange and learning formats that add a digital component to physical stays abroad. This allows students to experience internationalization even if a physical stay abroad is not possible. The portfolio of Universität Hamburg's partnerships with other universities also comprises the joint development and improvement of digital formats.

» On top of a comprehensive portfolio of methods, tools, and advising and support services, Universität Hamburg possesses the necessary spaces and (media) technologies for helping teachers and students plan, participate in, and implement a wide range of suitable learning and teaching scenarios in hybrid learning spaces. The availability of these requirements relies on the continuous, needs-based further development of spatial and technical infrastructures.

» Universität Hamburg consistently advances its range of digital services, processes and workflows for the organization of studies in a needs-based, user-centric manner. Compliance requirements such as user experience (UX) in the sense of simple, intuitive usability, data protection, and accessibility play a particularly important role in this process.

» In the spirit of its guiding principle of "Innovating and cooperating for a sustainable future," Universität Hamburg ensures that digitalization and sustainability (two of the University's cross-sectoral strategic dimensions and the major global transformations of our time) take place in close dialog, rather than competition, with each other. This means that the process of digitalization is carried out in a resource-conscious fashion and contributes to the aim of climate-neutral development. Universität Hamburg further helps teachers and students combine the two topics in the context of their studies and teaching.

(2) Teachers as guides and designers of learning spaces

Teaching staff play a central role in the planning of teaching programs. As such, they shape the conditions in which learning and studying take place. In the context of teaching in a digital environment, the target of the digital vision means:

» That quality teaching must be relevant to research. In other words: The academic material conveyed in a teaching context, the methods used by teachers, and the digital tools and data employed during

teaching must be at the latest state of research and technology. At the same time, good teaching must provide students with opportunities to participate in research and gather corresponding experience. With the tool kit and experiences gained, graduates are in a position to actively shape society ft.

» Through (international) academic partnerships, teachers incorporate a direct exchange between theory and practice into their courses, effectively combining a focus on research with a practical orientation developed at an early stage of their students' university careers. This means: There are courses that explore current issues and developments in our increasingly digitalized society, which facilitates joint reflection and exchange of ideas. Other courses are realized in collaboration with and for the benefit of societal stakeholders. This approach allows students to experience the digital transformation of society firsthand and play an active role in it.

» Teachers plan their classes using digital technologies and incorporate digital elements into their teaching methods in order to achieve relevant didactic objectives, to creatively leverage the potential of hybrid learning spaces for teaching and studies, to consciously utilize in-person teaching in a way that makes the most of its benefits and promotes the students' digital and data literacy, and flexibly responds to their students' needs for feedback and advice (e.g., in digital video consultations).

» Teaching staff shape teaching approaches based on their subject-specific and transdiciplinary knowledge and skills, and strive to improve continuously. Hence, they accept qualification offers and use exchange between colleagues and their own inquisitive nature to explore the didactic potential of hybrid learning spaces collaboratively thereby accumulating digitality knowledge and skills.

(3) Students as learners and co-designers of learning spaces

Students are at the center of all studies and teaching in higher education. Their needs, wishes, and demands must be the guiding light in the development of a digital strategy for studies and teaching:

» Students acquire academically sound knowledge, they learn and try out research methods and digital competences in the context of digital and data literacy, and they reflect on digitality from the perspective of their respective subjects—from informatics to the humanities—and specialized degree programs.

» Over the course of a degree program, students are furnished with the best possible education to help them live up to their full potential as citizens of an increasingly digitalized, technological and data-driven society and achieve their professional goals, be it in academia or business. This includes the development of digital and data literacy as the foundation of their competent participation in a culture of digitality.

» Students are given access to material and virtual learning spaces, which grant them the flexibility to conduct their studies location-independently and on their own schedule within a framework of didactically useful structures. They allow them to experience social interaction among peers and with teaching staff, study in accordance with their own preferences, develop new learning strategies and actively explore a research environment. Digital tools and processes supplement in-person teaching and simplify the organization of studies.

» Students receive instruction, guidance, and support (at the academic, methodological, ethical, and personal level) from dedicated teachers, preparing them for the challenges, risks, and opportunities of digitalization.

» Students are one of the most important stakeholder groups in Universität Hamburg's quality assurance system. They actively share their expertise and experience in the context of the working groups and committees on quality assurance in studies and teaching, thus making an important contribution to the quality-assured improvement of the University's academic programs.

» By collaborating with each other and exchanging views and ideas (in working and study groups, departmental student bodies and tutorials), they play an important role in creating a pleasant social atmosphere and making the University a place of learning. They take advantage of the available offers and versatile opportunities to collaborate with each other and use digital tools, independently utilize options for creative involvement, and are aware of their own responsibility for their education. Students can actively and unbureaucratically shape the University's academic programs and contribute to the development of hybrid learning spaces and technology, which gives them a concrete say in the future of their institution.

3.2.3 Target dimensions of university studies

Based on the 2015 recommendations of the German Council of Science and Humanities and in accordance with the guiding principle for teaching, a degree program combines three central components: (1) the student's development of an academic competence in the chosen subject(s), (2) the student's personal development as a person in the socio-cultural environment of the University, (3) the student's qualification for a professional career.

(1) Academic competence

» Students are in continuous, direct contact with excellent researchers and teachers in order to learn and practice reflection and critical thinking (this also takes place during exchange between students). This presence within the discipline benefits from the responsible use of digital technologies when

planning studies and teaching, as such technologies create new opportunities for a wide spectrum of interaction and innovation.

» Education through scholarship and research-based teaching can manifest themselves in many different forms depending on the discipline, and they produce a wide variety of degree courses and approaches to teaching. Contents relevant to digitalization are translated into digital teaching and learning scenarios at the discipline-specific and interdisciplinary level while undergoing permanent adaptation to changing conditions.

» Hybrid and digital teaching and learning scenarios facilitate greater incorporation of (international) experts from the spheres of academia, education, culture, business, and politics into the University's teaching activities. This promotes excellence in studies and teaching (for example, by inviting (international) experts to be (visiting) lecturers, organizing expert contributions to teaching scenarios, and integrating innovative and current insights from international research).

(2) Personality development

» Beyond mere academic achievements, education through scholarship aims to help students develop their personalities. As such, studying also incorporates a transformation of the students' relationship with themselves and the world. Within the scope of their university education, students explore fundamental questions, key problems, risks, challenges for democracy and society, and opportunities offered by digitalization and digitality from an interdisciplinary perspective in order to develop an inquisitive mind and a rounded personality.

» During open exchange with their teachers and fellow students, they acquire interpersonal, social and communication skills and take advantage of collaborative opportunities in physical and virtual teaching and learning spaces.

» Innovation (or: a culture of innovation), enthusiasm for academia, a modern culture of error management, and an appetite for risk permeate all areas of the University. As much as possible, degree courses enable students to experiment in a safe environment and learn from their mistakes. Digital work processes and infrastructures exemplify progress and the realization [SY2] of digital transformation in society and business.

(3) Career guidance

» Institutions that educate students also respond to needs in research and science, academia, culture, business, politics, and societyt.

» Upon completing their studies, students are willing and able to responsibly initiate changes and innovation across all areas of society, to experiment and plan, and to ask critical questions.

» Through their targeted use of digital tools and technologies in hybrid learning scenarios, their work with digital data, and their critical exploration of data-driven structures, they learn to work with (digital) interaction and collaboration systems and become familiar with data practices. These technical and communication skills, coupled with the ability to encode and decode data, are fundamental requirements for successful participation and active involvement in the digital and international labor market.

» A strategically curated and active alumni network gives students far-reaching access to networks across all sections of society (science and scholarship, culture, business and politics) while they are still at university.

These three dimensions must not be allowed to develop independently of each other. Rather, academic competence, personality development, and career guidance must exist in conjunction with each other and correct each other. This makes it possible to pursue a balance between the three dimensions as a concrete goal.

3.2.4 Strategic digitalization objectives and areas of activity

Together with representatives of various target groups from studies and teaching,[7]the following strategic goals and fields of activity were developed. They are to be viewed as university-wide guiding lights for the strategic advancement of studies and teaching in the digital age.

(Z1) Boosting the appeal and quality of studies at Universität Hamburg by developing modern academic programs

Universität Hamburg is revising its course catalog with a view to the future: digitalization is deliberately included across the board (e.g., as a research/teaching subject, in methods and tools, and in the general conditions for study) and leveraged as an opportunity for improving the appeal and quality of the University's academic programs.

[7] The following parties were involved: students, teachers, employees of the various offices for academic affairs (faculty and central perspective), Campus Management, supporting staff for digital teaching and learning from the domains of infrastructure, (media) technology, didactics, accessibility, equal opportunity, and internationalization.

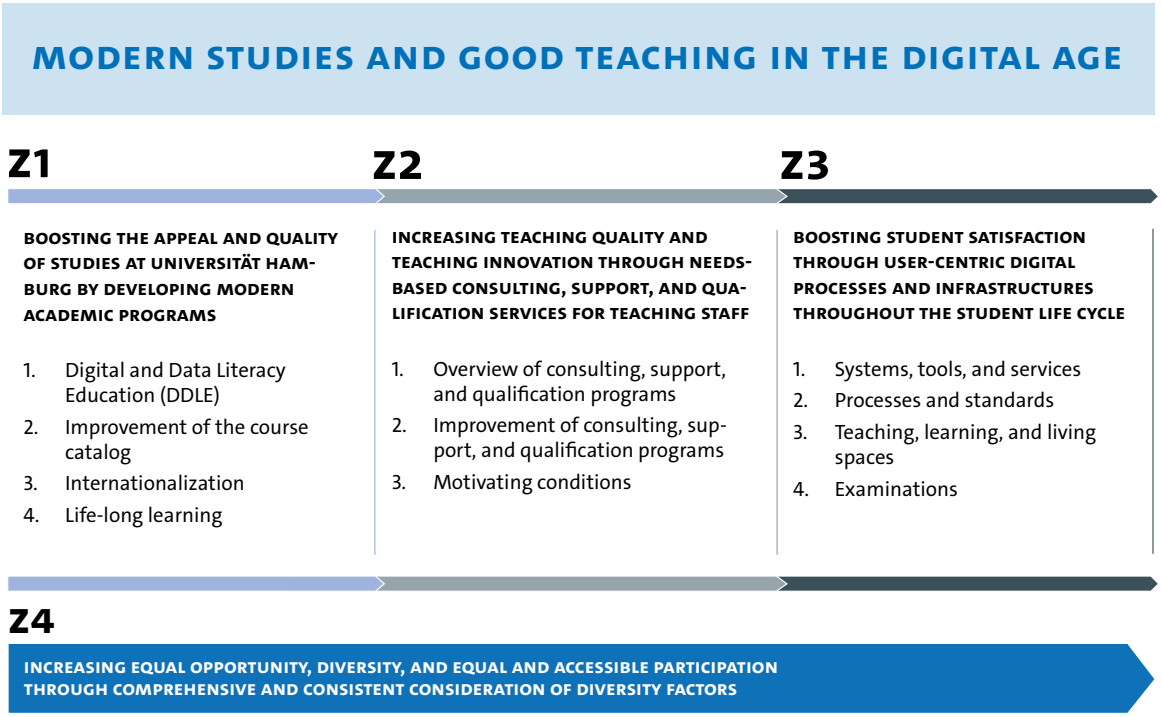

FIGURE 5 STRATEGIC GOALS AND AREAS OF ACTIVITY IN STUDIES AND TEACHING

ACCESSIBLE FIGURE DESCRIPTION ON PAGE 69

(1) **Digital and data literacy education (DDLE):** Anyone wishing to navigate a digitalized world and competently and confidently requires digital competences and the ability to read, understand, and interpret data and make decisions based on that data (digital and data literacy). Universität Hamburg wants to enable all students to approach digitality in a thoughtful manner and develop fundamental digital and data competences. To this end, it is working on an interdisciplinary digital and data literacy portfolio within the scope of the Studium Generale (various levels of depth and various areas of concentration), which is open to students of all subjects. In addition, the various subjects are invited to develop subject-specific digital and data literacy (DDLE) programs.

(2) **Improvement of the course catalog:** Universität Hamburg aims to advance its course catalog with a strategic view to the future. It is reviewing its existing curricula to identify subject-specific innovation and changed graduate requirements relating to digitalization and digital transformation and seeks to amend the programs wherever useful (e.g., by integrating subject-specific/interdisciplinary DDLE offers). In addition, it is actively supporting and initiating the development of new study programs with a concrete link to digitalization (e.g., a master's degree in data science).

(3) **Internationalization:** Digitalization also opens up new opportunities for internationalization in studies and teaching. Alongside the more flexible integration of international experts into individual courses, the new technical possibilities available lay the foundation for the strategic establishment of digital exchange, teaching, and study formats with international collaboration partners (incoming/outgoing). This makes international studying and teaching experiences accessible to students and teachers who cannot or, for reasons of climate neutrality, do not wish to participate in traditional exchange formats involving physical travel. Universität Hamburg is evaluating its strategic partnerships with the aim to expand its international collaborative efforts in the field of digital studying and teaching formats.

(4) **Life-long learning:** The University seeks to be a lifelong source of learning and education for its members. Digital technologies offer many opportunities for study and professional-education programs that can be delivered flexibly in terms of time and place, taking into consideration the age, circumstances, and stages of life of a heterogeneous student body. Universität Hamburg is developing a structured strategy for expanding, strengthening, and widening its professional development and certificate programs to meet qualification requirements in the context of digital transformation. In this process, the University's current position on open educational resources (OER) will be evaluated, too.

(Z2) Increasing teaching quality and teaching innovation through needs-based consulting, support, and qualification services for teaching staff

Digital technologies and tools bring many opportunities for planning and designing teaching and learning scenarios. At the same time, however, the process of understanding new digital technologies and data-based methods, adapting them to existing teaching concepts, and implementing learning and teaching concepts in the hybrid digital space (synchronously and asynchronously) poses extensive challenges for university teachers. Corresponding advice, qualification, and support services that are targeted explicitly to the needs of teachers and help them (re-)plan their teaching are needed to promote innovation and quality in teaching, in particular, in digital and hybrid learning spaces. Simultaneously, Universität Hamburg must establish suitable conditions in which innovation and creativity can thrive.

(1) **Overview of consulting, support and qualification programs:** Universität Hamburg already offers comprehensive support services for teachers, taking digital components and requirements into account: A binary distinction between analog and digital teaching and learning formats is no longer useful. Large parts of the University's advice and support structures are based in the faculties and, as such, decentralized. This aids the provision of direct, needs-based, specialist advice and support to teachers and contributes considerably to improving teaching quality. As well as these decentralized support structures, there are central services and a cross-faculty network of all support units. This network also develops cross-faculty programs that leverage synergies. While this diversity of contents and access options has a positive impact on the quality of support, advising, and qualification services, it makes it difficult to gain an overview of the entire support portfolio available. Within the scope of its strategic development, the University plans to establish a comprehensive overview of all existing support services as an easily accessible, well-structured, needs-based guide for teaching staff.

(2) **Improvement of consulting, support, and qualification programs:** Suitable advising, support, and qualification programs must be expanded and made available permanently in order to facilitate media production and the implementation of digital teaching, learning, and examination scenarios. Such services are an indispensable foundation for the proactive, targeted expansion of digitalization in teaching. Universität Hamburg aims to expand and further interlink all existing support and consulting units for digital and hybrid teaching in the central and faculty institutions in order to leverage synergy effects in the best possible way. The key criteria for this process include the retention of specialist contacts and, in parallel, synergies plus the integration of voting and communication processes for centralized (e.g., DL, e-offices, DL Network) and centralized support structures (e.g., HUL, Section 32: Campus Management) at the operative and strategic level. Universität Hamburg's existing qualification catalog will be expanded, refined, and developed further to cater to specific teaching needs in the context of digital and hybrid teaching (e.g., in the fields of higher-education teaching, media technology, software applications, data protection) to promote digital and data literacy.

(3) **Motivating conditions:** The adaptation and innovative advancement of modern teaching and learning formats in hybrid learning spaces require a great deal of intrinsic motivation, experimentation, and creativity. At the same time, the development, trialing, and systematic evaluation of and reflection on new teaching and learning concepts are time-consuming. Teachers struggle to master them as part of their day-to-day work, as the increasing digitalization of teaching and learning scenarios already adds to their tasks, availability requirements, and responsibilities. Their efforts nevertheless contribute significantly to quality improvements in teaching, and Universität Hamburg intends to appreciate them more in future. To this end, the University is implementing structural requirements and motivating services that enable and encourage teachers to adapt their teaching methods to the digital age. It is aware that time and space for experimentation are key in this endeavor.

(Z3) Boosting student satisfaction through user-centric digital processes and infrastructures throughout the student life cycle

The processes and infrastructures underpinning the management of studies and teaching throughout the student life cycle are consistently under development, taking modern digital standards and intuitive usability into account. The purpose of this process of continuous improvement is to make teaching and the organization of studies easier, improve student satisfaction, and support the responsible employees and teachers in their ability to carry out their work.

(1) **Systems, tools, and services:** In the digital age, good teaching and modern study management rely on the availability of a holistic portfolio of digital systems, tools, and services Universität Hamburg consistently improves and advances its arsenal of digital systems, tools, and services for studies and teaching, taking into account requirements such as user experience (UX), accessibility, and data protection conformity in the context of compliance audits. The further development of the system landscape focuses on improvements to the campus management system (CaMS) and to the system integration process aimed at interlinking the CaMS and learning management systems (LMS), launching a digital student ID, and rolling out a digitally supported curriculum-planning software. Key

priorities in advancing the University's digital tool kit and service landscape are the development of a corresponding requirements and portfolio management and the roll-out of digital collaboration tools.

(2) **Processes and standards:** One of the highest priorities in the digitalization of study management is the optimization and cross-faculty advancement of core tasks and (administrative, support, and advising) processes in studies and teaching, followed by their standardization and, where useful, translation into digital workflows, systems and tool-supported services. The ad-hoc digitalization of processes caused by the pandemic is being discussed and evaluated with input from all involved parties (teachers, examiners, committees, students, study management, etc.), and the insights gained from this process inform the development of corresponding process structures and service/advising standards. The objective of the process is the professionalization of the process landscape in studies and teaching for the benefit of students and teachers.

(3) **Teaching, learning, and living spaces:** As a university in which in-person teaching has always played an important role, Universität Hamburg now faces the challenge of revising its existing room concepts for teaching and learning spaces along with their media technology and digital and infrastructural equipment and the overall university environment in the long and short term so as to ensure that they meet the changed requirements of students and teachers in the digital age. This includes the option of switching quickly between physical and virtual teaching and learning formats, the availability of individual and group work stations for online activities and collaborative (hybrid) work, the provision of standardized, modern media technology in classrooms (taking subject-specific needs into account), and the establishment of innovation spaces for trialing analog and digital tools, scenarios and methods. Learning and teaching environments must be inclusive and facilitate participation in accessible teaching and learning formats (face-to-face, hybrid, digital).

(4) **Examinations:** The digital transformation has changed requirements and brought new opportunities for developing digitally based examinations. Digital exam submissions (e.g., term paper with movie quotes, e-portfolios), in particular, necessitate new processes and suitably adapted infrastructures (e.g., submission, feedback, access, and archiving). Within the context of the University's existing experiences with digital examinations and digital examination submissions during the pandemic and in consideration of its pre-pandemic projects for digital and electronically supported examinations, there will be a comprehensive discussion of possibilities for developing modern examination scenarios and processes. Universität Hamburg seeks to establish a legally watertight foundation for diverse formats of subject-specific digital exam concepts. To build a basis for the expansion of the University's infrastructures and processes for digital and/or electronically supported examination formats (e.g., written examinations, e-portfolios, oral examinations), a structured evaluation of possibilities and the development of a road map for trialing and advancing relevant scenarios will be carried out. This will constitute an integral part of the future strategic implementation of the digital strategy.

(Z4) Increasing equal opportunity, diversity, and equal and accessible participation through comprehensive and consistent consideration of diversity factors

By taking diversity criteria into account when implementing digitalization projects in studies and teaching, the University can increase equal opportunity and equal, accessible participation in virtual and physical teaching, learning, studying, and advising scenarios.

Universität Hamburg aspires to be an environment of inclusion, diversity, and equal opportunity. The accessibility of all services and programs in the fields of teaching, academic advising, and organization of studies is a key criterion for all developments in infrastructure, room concepts, and teaching/learning programs. To achieve this, Universität Hamburg uses a systematic overview of exclusion risks and inclusion requirements for the diversity categories listed in its diversity policy. These risks and requirements are guidelines for all infrastructure measures, both in terms of hardware and room equipment and in terms of the launch of digital tools and applications. To aid the achievement of the above goal, University representatives from the areas of equal opportunity, family and diversity, and accessibility are involved in all projects concerning the planning and implementation of corresponding processes. Universität Hamburg further strives to expand its support structures for students with special needs.

3.3 DIGITAL STRATEGY FOR KNOWLEDGE EXCHANGE

As a University of Excellence, Universität Hamburg is developing in three performance areas: research, teaching, and—a newly independent performance area that is currently at the center of development efforts—knowledge exchange. Conceived as a broad concept, knowledge exchange must play two specific roles: firstly, as a performance area that is decentrally served by the faculties and centrally supported by the Knowledge Exchange Agency; secondly, as a cross-cutting issue in research, teaching, and administration. It has an internal and an external component. While the internal component represents the cross-subject and cross-departmental networking of projects and processes within Universität Hamburg, the external component focuses on networking with society. The University's knowledge exchange projects are based on the quintuple innovation helix framework, a concept describing the interaction between universities, governments and industry players plus, more recently, the (medialized) public and natural environment. This collaborative structure is influenced by (knowledge-)economic and socio-ecological aspects, making it a central building block in Universität Hamburg's contribution to sustainable development.

The University's concerted efforts to expand knowledge exchange aims to promote internal and external networking. To this end, the University develops and establishes suitable spaces and formats for exchange, both analog and digital, most of which are devised with input from the relevant target groups. Simultaneously, the Knowledge Exchange Agency supports the professionalization of communication-based relationships with external stakeholders within the framework of customer relationship management (CRM).

The University is rolling out a university-wide CRM database to manage its external partner contacts. At the moment, the infrastructural conditions for this project are being assessed and adapted to the needs of the various subjects and their cultures. Interdisciplinary synergy effects can counteract the segregation of the individual subject cultures (cross-sectoral task). This is merely one example of digital, cross-subject infrastructures under development in the field of knowledge exchange.

In addition, the promotion of knowledge exchange activities requires support for and development of the knowledge exchange process; this must take place on the basis of data-driven methods and in close connection and collaboration with academia, where the knowledge exchange process itself constitutes an interdisciplinary research subject. The project relies on the information systems provided by Universität Hamburg in its capacity of a knowledge organization, for example, a fully maintained research information system, its research data management, and platforms that are currently under development, such as UHH.digital. Its objective is the development of algorithms that support and, possibly, partially automate the innovation screening process within Universität Hamburg. This pertains, for instance, to questions of utilization, copyrights and, in the area of spin-offs, the data-driven identification of potential partners within and outside the University. Not least, it facilitates data-driven match-making to meet requirements in academia, industry, society, and politics.

As well as focusing on networking and the establishment of new, data-driven methods in the knowledge exchange process, Universität Hamburg takes on the role of a real-life laboratory for reflective research into innovation and transfer topics. As a result, the field of knowledge exchange becomes a research subject in its own right with a close connection to digital transformation.

3.4 DIGITAL STRATEGY FOR ADMINISTRATION

3.4.1 Preamble

The central responsibility of administration is to plan and implement the University's organizational, administrative, infrastructural, legal, and technical core processes for research, teaching, and knowledge exchange in collaboration with the recipients of these services. It strives to facilitate, support, and secure excellent scholarship in research, teaching, and knowledge exchange to the best of its ability. At the same time, it assures the legitimacy of strategic, budget and personnel decisions and processes at Universität Hamburg; in this context, it answers to clients and supervisory committees.

University administration in the digital age—smart administration

Research, teaching, and knowledge exchange take place in a dynamically developing, digitalized world. Digitalization also permeates all areas and organizational units of the University's administration, where it continuously shapes and changes ways of working, workspaces, roles, and responsibilities, and the culture of organization and communication. Networked, cross-departmental working, a pronounced service

mentality, and a high degree of user-centricity are becoming more and more important as the digital transformation progresses, and new requirements arise constantly for the processes, structures, systems, and services offered, operated, and implemented by the University's administrative units.

A holistic approach to digital transformation and automation requires the productive interaction of professional data, process, and system management structures. On this basis, quality-assured data, analyses, and reports, and data-driven decision-making tools effectively support the management and decision level in its strategic and operative decisions and risk assessment processes.

The user level—which comprises various target groups, such as students, teachers, researchers, administrative employees, and the University leadership—benefits from digital services which have been tailored and optimized to their specific needs and from a comprehensive, reliable, state-of-the-art digital infrastructure (tools, systems, processes, workflows, hardware etc.). Another important aspect is the continuous optimization of digital services and tools at the University. This requires an administration team who can not only make these services and tools available and operate them confidently but also advance and improve them on a constant basis in consideration of all relevant quality criteria.

The basic principles of user-centric services

Applications and services are especially well received when the solution closely matches the problem. Good professional applications effectively solve the challenges arising during day-to-day work and studies. That is why the University leadership plans the development of its digital services in a way that meets their users' needs (user-centricity). In particular, it takes aspects of accessibility and equal opportunity into consideration. Besides suitability and usability, other basic principles determining the acceptance of applications, processes and services are as follows:

» Data are captured once in a central location (once-only principle) so that quality-assured information can be made available automatically while avoiding redundant data entry.

» Services that are relevant for academic work, such as travel management, procurement, recruitment, project controlling, and the welcome service, are collectively provided from a central location, for example, one or a small number of selected service platforms (one-stop principle). Wherever possible, the administrative units provide services proactively, which means that the service recipients obtain their service without having to request it, as the provision of the service is triggered by a specific event (no-stop principle).

» Legally prescribed requirements in the fields of data protection, information security, and accessibility (IT compliance) are consistently observed so that usability improves for all users.

» Unambiguous service level agreements (SLA) specify clear time lines, responsibilities, and contacts for user inquiries, ensuring that they are processed transparently as regards the status and duration

of responses. Service recipients are further given insights into relevant process steps, especially when collaborating with external partners.

» The continuous optimization of services ensures that user interests and requirements are taken into consideration. Professional standards and guidelines are integrated into the development of digital services so that the latter are provided in a consistent and transparent manner. All user groups and responsible parties benefit from a comprehensive quality management system, including plans for quality initiatives which allow for different perspectives to be incorporated.

» Services are made highly recognizable within the University, for example, through clear and unique symbols.

» They are made available around the clock and independently of the user's location.

Digitalizing administration at Universität Hamburg

At Universität Hamburg, administrative processes are managed by many centralized and decentralized units (departments, sections, and units of the University Administration, administrative units in the faculties, and central institutions). Some of them provide extensive administrative services to various status groups at the University. In future, interdepartmental process planning and process involvement in consideration of the University's heterogeneity will be made a priority. This ensures that service recipients can access their services through a small number of central contacts. In this process, digitalization is not an end in itself. Rather, it is to be used in contexts where it creates value, for example, by facilitating new and more flexible ways of working, improving productivity, bringing competitive advantages, or achieving regional and global networking.

Especially in light of the University's excellence status and the fierce international competition surrounding it, a comprehensive, reliable, and user-centric digital infrastructure at the cutting edge of technology is a fundamental prerequisite for the success and impact of Universität Hamburg. The successful digital transformation of Universität Hamburg further requires extensive competences for the digital age. This includes the ability to use (digital) applications, the professionalization of process and project management systems, IT compliance topics, UX design, and soft skills in the context of modern approaches to work. HR Development must therefore provide a range of training and (further) qualification measures in the extended field of digital transformation, innovation and communication, aimed at specific target groups and tailored to their roles and responsibilities. This is crucial for the continuous development of the University's "smart administration," defined by a way of working that embraces networking, collaboration, equality, and transparency and promotes autonomous, interdepartmental action. In the area of Service and Support, this approach is imbued with a service mentality across all areas. It embodies user-centricity and a focus on service.

On its path towards smart administration, Universität Hamburg has merged various units to create the overarching Smart Administration Unit. As a service provider, this unit oversees the strategic process leading to the user-centric digitalization of administrative procedures. In the process of initiating and implementing digitalization measures, it governs the overarching aspects of prioritization, realization of synergies, economic feasibility, and quality assurance. The unit further provides support and advice to specialist departments and administrative units tasked with the concrete implementation of measures. This applies to topics such as process and project management, requirements management, IT compliance and documentation. Cross-sectional issues such as the further development of the data warehouse and the roll-out of a document management system are the direct responsibility of the Smart Administration Unit.

The responsible members of staff (service owners) develop digitalization concepts and corresponding implementation measures based on their strategic specialist considerations and their own assessment while always referring to Universität Hamburg's digital strategy. To support them, the Regional Computing Center (RRZ), in its capacity of a modern and innovative IT service center, provides them with the necessary information technology. Depending on the service, it plays an advisory or operational role in the development of digitalization measures, operations, technical administration, and technical support. In specific issues of IT compliances, the service owners and all other groups are supported by the commissioners for data protection, information security, and accessibility.

Hybrid working methods and environments

As a forward-looking university in the digital age, Universität Hamburg seeks to gain a detailed understanding of digitalization in the context of day-to-day work. It pursues an integrated approach that consciously refrains from drawing a dichotomy between analog and digital work. The University's objective is to achieve a form of digitality that leverages opportunities and potentials provided by both the analog and digital world. Its smart administration makes digitality an integral component of working methods, environments, and processes, implying networked work in hybrid working spaces. Hybrid working spaces supplement the physical workplace by introducing digital potential. They facilitate the targeted expansion and innovation of work scenarios across all areas of administration.

By planning, trialing and implementing such hybrid approaches to work in a needs-based manner, Universität Hamburg explores the topic of New Work within the scope of its university-wide change process. [SY3] The corresponding project provides the structural framework and coordinating interface for various initiatives and questions that are given attention in the context of new working methods, environments and processes. Examples include: location-independent working, designing modern workspaces and digital collaboration tools, and changes in leadership and (cross-functional) collaboration and their impact on processes. In this way, the project promotes interdisciplinary collaboration between various departments and units, maintaining various interfaces with the digitalization endeavor "smart administration.".

Limits of smart university administration

Smart university administration takes charge of projects wherever the interests of Universität Hamburg and its members require it to do so. This approach runs up against limitations when extraneous frameworks, detached from the aim of supporting academic processes, impede or even limit [SY4] targeted, solution-oriented and resource-friendly working and, by doing so, threaten the University's international and domestic competitiveness. This includes regulations imposed by the Free and Hanseatic City of Hamburg which oblige the University to participate in an involuntary collaboration with municipal partners, for example, in the fields of property management (including the current state of the buildings), IT, finance and accounting, and human resources. Further limitations arise from restrictive interpretations by the Hamburg data protection authority and insufficient/vague laws set out by the Hamburg higher education act (Hamburgisches Hochschulgesetz, HmbHG), particularly in the context of digitalization in teaching. The University management maintains a constant exchange with the institutions of the Free and Hanseatic City of Hamburg and other higher education institutions in Hamburg and beyond in order to change these conditions and make them more suitable for the needs of academia.

3.4.2 Digital vision for administration

Universität Hamburg is a place of excellent research, teaching, and knowledge exchange activities, supported optimally by modern administrative processes. With its many members and its heterogeneous status groups, Universität Hamburg unifies a wide range of perspectives that must be taken into consideration when implementing digitalization measures.

As an institution, Universität Hamburg (1) provides the framework for excellent research, in which the responsible employees (2), the service users (3), and the service recipients (4) operate.

(1) Universität Hamburg as an institution

As an institution, Universität Hamburg implements the framework for smart university administration and provides the cultural, infrastructural, financial, and HR conditions and resources needed for modern administrative work.

» Universität Hamburg possesses transparent organizational and decision-making structures and (digital) processes with a clear delineation of responsibilities. These constitute the foundation for the strategic management, advancement, and implementation of digitalization. In particular, they include the sounding boards for digitalization and information technology, the positions of chief digital officer (CDO) and chief technology officer (CTO), the cross-domain sounding board (research group for digitalization projects), and the unit-specific competence units for digitalization in research, teaching, and administration. With these structures, the University enables the responsible individuals to make good and well-informed decisions quickly while taking likely consequences into account.

» Universität Hamburg takes all affected status groups and their needs into account when developing its organizational structures, services, and processes. It gives them opportunities to participate in this development process. By interlinking central and decentral structures, Universität Hamburg ensures that its services are consistent, scientifically sound, and based on concrete needs. This ensures that the University' members accept these structures and identify with the organization.

» Universität Hamburg provides the resources needed for implementing relevant, university-wide digitalization measures. Its focus is on digitalization projects that provide the greatest possible value (e.g., increases and improvements in efficiency, usability, accessibility, information security, health and well-being) for employees, students, and institutional excellence.

» Responding to concrete requirements, Universität Hamburg makes function-specific rooms and technical equipment (work environments, IT infrastructure, tool landscape) available to enable efficient working in the future world of work, in which analog and digital methods will work closely together.

» The University ensures that its members have access to a comprehensive, needs-based catalog of services geared towards the development of digital competences, allowing them to confidently master the changing requirements arising from increasing digitalization. For purposes of smart university administration, this particularly includes the ability to use (digital) applications, the professionalization of process and project management systems, IT compliance topics, UX design, and soft skills in the context of modern approaches to work. As well as providing (further) training to its employees, Universität Hamburg is developing structures and measures to retain well-trained employees with digital and technical skills and expertise at Universität Hamburg and recruit new professionals.

» At the cultural level of the digital transformation, Universität Hamburg creates a space of learning, collaboration and trust, where actors think and work in networks, are confident to try new ideas and approaches proactively, and embrace their freedom to act and plan independently with courage and a sense of responsibility. This means that mistakes can be made and risks can be taken in order to reach good solutions and achieve lasting changes—with everyone aware that not every project will succeed. The University management provides the required advising, supervision/mentoring, and support formats to strengthen the autonomy, self-confidence, and self-efficacy of its employees in their work and within hybrid working spaces.

(2) Staff responsible for services, processes and systems (service owners)

Service owners are in charge of specialist (IT) procedures, services, processes, and systems that fall into their fields of expertise. They initiate and control measures and projects, plan services in close collaboration with the relevant offices (e.g., on their technical implementation), and continuously develop the underlying processes as needed and in consideration of all relevant quality and IT compliance criteria. To this end, they are provided with standardized services to aid the implementation of their projects, aiming

to coordinate and harmonize the various needs (usability, data protection, information security, accessibility) as effectively as possible. The Smart Administration Unit is responsible for cross-sectoral projects in the University management. This unit also oversees the digital transformation of the University's administrative areas in its capacity of a section-specific competence unit.

» The owners of specialist (IT) processes and digitalization measures continuously review the value, suitability, and user-friendliness of the planned solutions. They take the different perspectives of the service providers, users and recipients, compliance officers, and representatives of various interest groups into account. They further ensure that professional standards, developed to meet the users' requirements in consideration of applicable strategic and legal frameworks, are upheld. They are receptive to users' suggestions for improving their services.

» Service owners use the professional development and qualification offers provided by HR Development for their professional and personal development in the context of digitalization. As an overseer of the University's digital transformation, the Smart Administration Unit makes suggestions for the development of IT and digital competences and the clarification and further development of the university-wide project and process management system. HR Development receives these suggestions and uses them to expand the existing professional development portfolio, which addresses the needs of the University management, on the one hand, and supports all employees with development and career prospects, on the other.

» Within the scope of a comprehensive quality management system, service owners develop and monitor key indicators to assess the effectiveness and efficiency of their processes. They use the insights gained in this way to improve their processes continuously..

(3) Service users

The group of service users comprises members of the administrative staff and assistants in the University's administrative units who use (digital) services, processes, systems, and tools in their work. Service users can be contacts for service recipients (end users). By performing their duties competently, reliably and with a focus on good service, they contribute to the positive image of the administrative service within and outside of Universität Hamburg.

» In their interactions with service recipients, service users strive to provide a high-quality service, be professional, and address the recipients' needs. They perform their duties in the knowledge that their work reduces administrative efforts for the organization and other members of the University. Digital processes and tools simplify their work and the organization thereof.

» Service users contribute their expertise and ideas to the development of new services. They operate from a cross-sectoral perspective and look for needs-based, user-centric solutions that help advance Universität Hamburg's structures and services with added value for all its members. A project and

process management system is made available to support them. Service users autonomously initiate urgently needed changes within their area of responsibility. Managers support their autonomous decisions and accept initiatives started by employees from their areas of responsibility.

» Based on individual tasks, service users improve their IT and digital skills as needed. They further take advantage of professional development and qualification services beyond their own professional focus so as to gain soft skills for the digital transformation.

(4) Service recipients

The group of service recipients includes students and employees in research, teaching and administration. They use the services provided by the University management, which makes them the core target group of the service portfolio. Their needs and wants must be taken into consideration when planning and developing services.

» Service users receive quality services and experience a high degree of professionalism whenever they interact with Universität Hamburg. They easily and clearly identify the right contacts and the information they need. Service users contribute to the improvement of services via suitable ports of call.

» Their use of the University's (digital) services reduces their administrative and day-to-day workloads. They can find and access these services effortlessly at any time and from any location using a central entry point. Their user experience is visually appealing and intuitive. Whenever they face any challenges, the available support structures solve their problems with a high quality of service.

» Service users at Universität Hamburg are provided with analog and virtual working environments that allow them to work flexibly—both in terms of scheduling and location—within the scope of their own subject, team, and field of activity, to collaborate across departments, and to work in their preferred ways. Digital processes and tools complement, optimize, and simplify their organization and duties.

» Service users take advantage of the University's extensive, high-quality portfolio of professional development opportunities to improve their IT and digital skills and their digitalization-related soft skills.

3.4.3 Strategic digitalization objectives and areas of activity

The strategic digitalization goals and areas of activity detailed below constitute university-wide guiding principles for the further development of administration:

(Z1) SIncreasing service recipients' satisfaction by optimizing the service experience

The administration provides comprehensive administrative services for many status groups. To ensure that the service experience is intuitive and the service portfolio caters to concrete needs, these services are

consistently advanced and optimized with a view to user-centricity and quality standards. This improves satisfaction among service recipients.

(1) **User-centricity and service quality:** A pronounced service mentality and a high degree of user-centricity in planning the service portfolio are integral aspects of smart administration. They indicate a high quality of services. Service level agreements with the service providers are being developed to ensure the transparent, service-driven handling of projects. The user-centric end-to-end optimization of central administrative processes and workflows constitutes another focus. An overview of the University's digitalization structure (Digitalization Map) will reflect the service portfolio and make it accessible.
(2) **Quality standards for digitalization:** Universität Hamburg consistently develops and advances its digital service portfolio as needed, taking the basic principles of user-centric services into consideration. In addition, it develops compliance guidelines and quality standards for the intuitive design of digital services. The University's specialist departments have been tasked with developing concepts for digitalization and quality management in their own areas based on Universität Hamburg's digital strategy.

(Z2) Increasing employee effectiveness with support and qualification programs

Digital tools and processes can help to achieve substantial improvements in the University's administrative services. But learning new digital technologies also poses a challenge to employees. Suitable advice, support, and qualification programs are needed to facilitate the provision of quality services. These programs must cater to the employees' concrete needs and support them in planning and developing new and existing services and processes in their own fields. Simultaneously, Universität Hamburg must establish suitable conditions in which creativity and active participation can thrive.

(1) **Support portfolio:** The expansion and permanent availability of suitable advice and support structures in the context of digitalization is essential for ensuring employee capability. Within the scope of the University's strategic development, user-centric, high-quality, standardized guidelines (multi-modal and accessible) to using the official tool and process portfolio are being developed in English and German. They are made available through a portal (for example, the Digitalization Map). Supplementary training courses are offered as needed.
(2) **Motivating conditions:** An attractive working environment that makes it easy to reconcile work and family life, flexible and remote working, opportunities for professional and personal development, and space for participation and involvement all boost motivation. This is why the University is implementing structural requirements and motivating services that enable and encourage employees to adapt their services to the digital age. It is aware that time and space for experimentation are key in this endeavor.
(3) **Qualification opportunities:** IT and digital competences are essential to the development of user-centric services and processes. The University is expanding and improving its qualification and professional development programs in consideration of the specific needs of various target groups so as to ensure

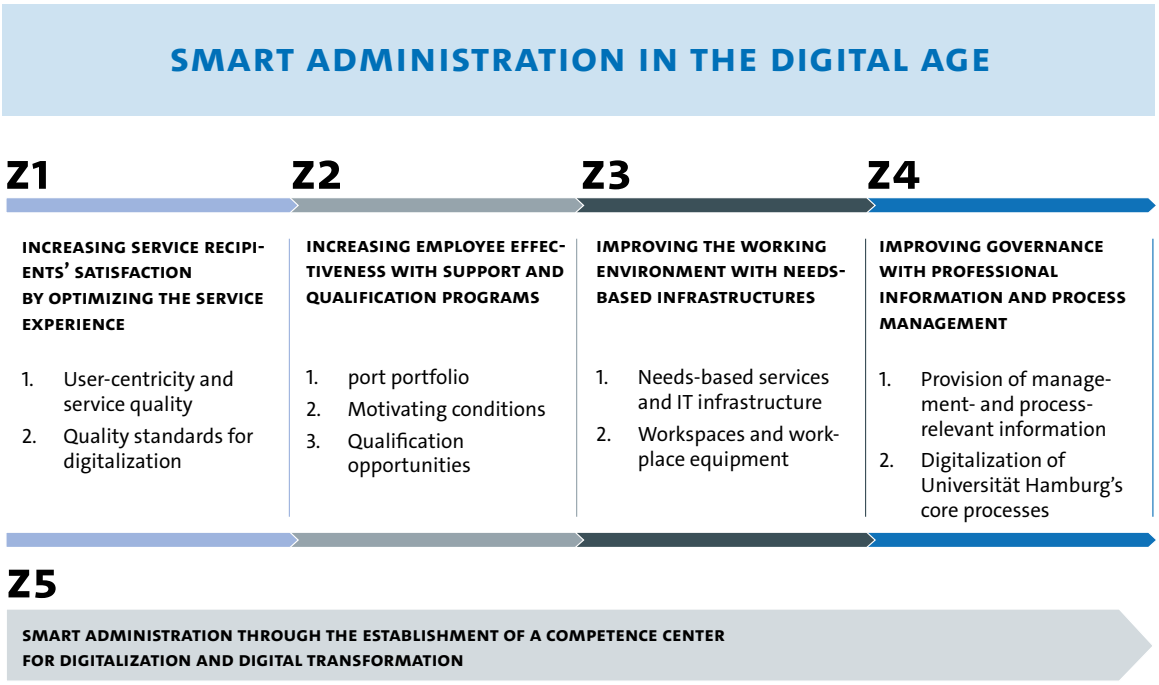

FIGURE 6 STRATEGIC GOALS AND AREAS OF ACTIVITY IN ADMINISTRATION
ACCESSIBLE FIGURE DESCRIPTION ON PAGE 70

that its administrative employees are appropriately trained. As well as teaching the standard tool kit, these programs especially focus on conveying a fundamental understanding of digitalization, digital process and project management, and requirements analysis for IT and digital processes.

(Z3) Improving the working environment with needs-based infrastructures

The University's administrative services and IT infrastructures are being developed consistently and in consideration of modern digital standards and intuitive usability requirements so as to simplify administrative processes and work organization methods. This increases the ability of the responsible employees to perform their duties efficiently. Universität Hamburg also ensures that its rooms and workspaces are designed and equipped to modern standards and in accordance with the needs of their users.

(1) **Needs-based services and IT infrastructure:** In the digital age, modern administration relies on the availability of a holistic portfolio of digital systems, tools, and services, including support. Universität Hamburg consistently improves and advances its arsenal of digital services and infrastructures, taking into account requirements such as user experience (UX), accessibility, and data protection conformity in the context of compliance audits. In is current stage, this process is focused on the roll-out of an enterprise content management system (ECM) and a document management system (DMS),

including electronic signatures, a tool to facilitate legally watertight digital votes, and a university-wide translation tool.

(2) **Rooms and workplace equipment:** Digitalization is changing the ways in which we work. Digital working, hybrid meetings, and concepts such as desk-sharing raise new requirements for office and workspace concepts and the equipment of such spaces. Universität Hamburg addresses these issues within the scope of the New Work project and the interface project Workplace of the Future. Its sub-projects are dedicated to legal aspects and the development of standards for the needs-based, modern design and equipment of hybrid offices for the digital age. They also focus on the launch of a university-wide, digital room booking tool to optimize occupancy planning and utilize meeting rooms and workspaces flexibly.

(Z4) Improving governance with professional information and process management

By making management-related information and process-supporting data available in a user-centric and purposeful manner, the administrative units enable their members to assess the legitimacy of decisions and the correctness of processes. This information is required, in particular, to digitalize and optimize central core and support processes for the benefit of their users.

(1) **Provision of management- and process-relevant information:** ased on professional data and system management, the University's administrative units provide quality-assured data, analyses and reports, and data-based decision-making tools in an intuitive and useful format. These aids support the University leadership and the management and decision-making level in their strategic and operative decisions and their quality assurance and risk assessment processes. The administrative units are further responsible for collecting process-related data, assuring their quality and making them available to facilitate the continuous advancement of governance and core processes.

(2) **Digitalization of Universität Hamburg's core processes:** To boost the efficiency of collaboration, leverage potentials and synergies, and improve the user experience and quality of services, Universität Hamburg plans to map, optimize, and digitalize its core processes with help from an external service provider. During the introduction of a document management system (DMS), it seeks to turn its processes into automated workflows wherever possible.

(Z5) Smart administration through the establishment of a Competence Center for Digitalization and Digital transformation

Under the coordination of the Digital Office and the Smart Administration Unit, a Competence Center for Digitalization is being developed. It pools all competences surrounding requirements management, service design, process and project management, development, operations, etc. The relevant area-specific competence teams (digital administration, digital research, and digital teaching) from the corresponding competence units are key components of this project.

APPENDIX

Accessible figure descriptions

FIGURE 1: UHH DIMENSIONS OF DIGITAL TRANSFORMATION

The figure is entitled „UHH dimensions of digital transformation“. The graphic is divided into four rectangles. Each rectangle represents a dimension of the digital transformation: (1) People & Competences, (2) Data and Processes, (3) Organization and Collaboration, (4) IT and Innovation.

The **rectangle on the top left** contains the heading „People and Competences“, to which the following sub items belong:

- Train next generation of digital experts
- Raise awareness of employees regarding the challenges in the digital (working) world and enable them to act confidently
- Attract the brightest minds to Universität Hamburg and the Hamburg Metropolitan Region
- Draw specialists and academic innovation to the Hamburg Metropolitan Region

The **rectangle on the top right** contains the heading „Data and Processes“, to which the following sub items belong:

- Establish professional data management as the foundation for digital processes, analytics, decision-making, and cross-departmental collaboration
- Strengthen knowledge of data, processes, user-centricity and increase responsibility for data quality across the University
- Collect, optimize, and map core processes into digital workflows
- Ensure implementation of OZG (Onlinezugangsgesetz (German Online Access Act)) quality criteria (compliance, UX, etc.)

The **rectangle on the bottom right** contains the heading „Organization and Collaboration“, to which the following sub items belong:

- Actively shape the cultural change initiated by the digital transformation in a human-centric approach
- Advance organizational structures and working methods
- Promote project-oriented, inter-departmental work

» Strengthen networking and collaboration at Universität Hamburg, in the Hamburg Metropolitan Region and internationally
» Promote transparent communication that meets the specific needs of the target group.

The **rectangle on the bottom left** contains the heading „IT and Innovation", to which the following sub items belong:
» Promote digital working methods and collaboration across the University with digital services and infrastructures addressing the user's needs
» Continuously and proactively develop of the future workplace (offering remote working wherever this is reasonable)
» Drive innovation with data-driven digital methods, technologies, and tools, set impulses

To the figure

FIGURE 2: DIGITAL STRATEGIC DEVELOPMENTS AT UHH

The diagram is entitled „digital-strategic developments at UHH". It depicts the further development of the Universität Hamburg in the area of digitalization and digital transformation along successive development phases. These are visualized on an arrow, which is intended to illustrate the long-term development of UHH. The structure of the main graphic builds on the phases depicted there. A total of five phases are distinguished: The initial situation, which lasted until 2019, is followed by the build-up stage (from July 2019 to March 2021), the strategy development phase (from January 2021 to December 2022), the strategy implementation and evaluation phase (from January 2023 to December 2028), and finally the provisional final state, the vision, which is advised in the strategy and which is to be achieved in 2028.

For each of these phases, the figure depicts important milestones in form of a table, which in turn are assigned to five different dimensions: The dimension of the institution as a whole, abbreviated here as „UHH", the three performance areas of research, studies and teaching, knowledge exchange, and the dimension of administration.
The **„initial situation"** is described in this table as a phase in which an isolated development of digitalization projects took place.
» For the dimension of UHH, it says: lack of a strategic foundation for digitalization at Universität Hamburg and high dependence on systems and processes of the Free and Hanseatic City of Hamburg (FHH)
» For the performance area research, it says: digitalization gains a long-term strategic basis within the scope of the Excellence grant application
» For the performance area studies and teaching, it says: individual initiatives without organizational embedding and networking

» For the performance area knowledge exchange, it says: knowledge exchange is not a performance area of Universität Hamburg
» For the performance area administration, it says: individual initiatives without organizational embedding and networking

The awarding of the status of a University of Excellence is visually represented in the figure as a rupture with the initial phase – here, a red line separates the "initial situation" from the "build-up stage". It represents the kick-off for a strategic digitalization initiative at UHH and forms the basis for the subsequent „build-up stage".

The **„Build-up stage"** is described in this table as a phase of initiation for the establishment of strategic organizational structures of digitalization. The organizational structures initiated and founded in this phase are listed for each of the dimensions.
» For the dimension of UHH, these are: Chief Digital Officer (CDO) and Digital Office as well a cross-domain sounding board for digitalization and IT
» For the performance area research, these are: the sounding board for digitalization and IT in research as well as House of Computing and Data Science which is responsible for the development and expansion of data and methodological sciences
» For the performance area studies and teaching, these are: the sounding board for digitalization and IT in studies and teaching as well as the Campus Management section responsible for the digitalization of the Student LifeCycle
» For the performance area knowledge exchange, this is: the Knowledge Exchange Agency
» For the performance area administration, these are: the sounding board for digitalization and IT in administration as well as the Smart Administration Unit especially in charge of digitizing the University's core processes

The **„strategy development" phase** is described in this table as the phase of developing a holistic Digital Strategy for UHH.
» For the dimension of UHH, this includes: the development of a Digital Vision and Strategy for the University as well as the improvement of strategic structures
» For the performance area research, this includes: the development of a digital strategy for research as well as the (further) development of the computer science strategy (incl. follow-up of ahoi.digital)
» For the performance area studies and teaching, this includes: the development of a digital strategy for studies and teaching which took place in form of a participative process involving various University status groups
» For the performance area knowledge exchange, this includes: the development of a digital strategy for knowledge exchange
» For the performance area administration, this includes: the development of a digital strategy for administration as well as the initiation of large-scale digital projectse

The **„strategy implementation and evaluation“ phase** is described in this table as a phase in which the implementation and (further) development of the UHH Digital Strategy takes place.

» For the dimension of UHH, this means: the introduction of a strategy evaluation and development process as well as the planning and implementation of the roadmap for the Digital Strategy of UHH
» For the performance area research, this means: the project planning and implementation of the roadmap for the digital strategy for research with a focus on methodological competences and research process
» For the performance area studies and teaching, this means: the project planning and implementation of the roadmap for the digital strategy for studies and teaching with a focus on digital study experience and further development of teaching content
» For the performance area knowledge exchange, this means: the project planning and implementation of the roadmap for the digital strategy for knowledge transformation
» For the performance area administration, this means: the project planning and implementation of the roadmap for the digital strategy for administration with a focus on data and processes

The **„vision“ phase** is described in this table as the achievement of the target image „UHHdigital 2028“ formulated in the strategy. Here, the achievement of the dimension-specific target image applies to each of the dimensions.

» For the dimension of UHH, this is the Digital Vision of UHH on an overall institutional level
» For the performance area research, this is the digital vision for research
» For the performance area study and teaching, this is the digital vision study and teaching
» For the performance area knowledge exchange, this is the digital vision knowledge exchange
» For the performance area Administration this is the digital vision administration

To make it clear that the phases do not represent self-contained entities, the figure includes another arrow running from the build-up stage to the vision phase, which is intended to illustrate the „continuous further development of digitalization-relevant organizational structures and processes and the Digital Strategy“. Two icons in the form of circular arrows provide additional visual support for this statement.

To the figure

FIGURE 3: STRATEGIC GOALS AND AREAS OF ACTIVITY AT UHH

This figure is titled „strategic goals and areas of activity at UHH“. The headline reads „modern knowledge organization in the digital age“. The figure is divided into four columns corresponding to the four dimensions of digital transformation: Data and Processes, IT and Innovation, Organization and Collaboration, People and Competences. A strategic goal was identified for each of the dimensions. Each of the goals is divided into several areas of activity.

Goal 1
For the dimension "Data and Processes", the overarching strategic goal is: Increasing institutional efficiency and effectiveness through professional data and process management. This includes the following strategic areas of activity:
(1) Further development and expansion of the data warehouse
(2) Process platform and digital records
(3) Professionalization of compliance structures

Goal 2
For the dimension "IT and Innovation", the overarching strategic goal is: Increasing the (international) appeal of Hamburg and boosting its competitiveness with modern IT infrastructure and digital structures for innovation and networking. This includes the following strategic areas of activity:
(1) IT infrastructure, service portfolio, and support structures
(2) UHH.digital platform and digitalization roadmap

Goal 3
For the dimension „Organization and Collaboration", the overarching strategic goal is: Strengthening interdepartmental networking and collaboration through organizational development, digital collaboration solutions, and digital and transformation projects. This includes the following strategic areas of activity:
(1) Social intranet and collaboration platform
(2) Organizational structures and professional project/change management

Goal 4
For the dimension „People and Competences", the overarching strategic goal is: Recruitment and qualification of digitally competent professionals through targeted measures. This includes the following strategic areas of activity:
(1) Competence development in IT, digitalization, and change
(2) Recruitment of professionals in IT, digitalization, and change

Goal 5
A fifth strategic goal cuts across all four of the above goals. It forms the basis for all strategic developments in the area of digitization and digital transformation and states: Addressing the cross-sectional topics of internationalization, sustainability, equal opportunity, and (digital) accessibility consequently. There are no formulated strategic areas of activity for this goal.

To the figure

FIGURE 4:
STRATEGIC GOALS AND AREAS OF ACTIVITY AT UHH IN RESEARCH

This figure is titled „strategic goals and areas of activity in research“. The headline reads „excellent research in the digital age “. The figure is divided into three columns, each of which represents a strategic goal for digital transformation in research. Each of the goals is divided into several areas of activity.

Goal 1
Boosting research excellence and the city’s academic appeal with digital methods and interdisciplinarity. This includes the following strategic areas of activity:
(1) Strengthening of the computer science core incl. synergies from the sciences
(2) Strengthening DS and AI at the interdisciplinary interface
(3) Ethics in the context of digitalization/digital transformation and information technology

Goal 2
Boosting innovation through targeted support for early-career researchers and professional development opportunities for researchers. This includes the following strategic areas of activity:
(1) In-house junior staff pipelines and tailored recruiting strategies
(2) Motivating condition
(3) Qualification and professional development portfolio

Goal 3
Optimizing research conditions through processes and infrastructures addressing the researcher’s needs. This includes the following strategic areas of activity:
(1) Needs-based services and infrastructures, efficient and effective support processes
(2) Research rooms and workplace equipment
(3) Compliance standards
(4) Digitalizing the research process (RDM, FIS)

Goal 4
A fourth strategic goal cuts across all three of the above goals and states: excellent research through networks, cooperation, internationalization, knowledge exchange. There are no formulated strategic areas of activity for this goal.

To the figure

FIGURE 5:
STRATEGIC GOALS AND AREAS OF ACTIVITY AT UHH IN STUDIES & TEACHING

This figure is titled „strategic goals and areas of activity in studies and teaching". The headline reads „modern studies and good teaching in the digital age". The figure is divided into three columns, each of which represents a strategic goal for digital transformation in studies and teaching. Each of the goals is divided into several areas of activity.

Goal 1
Boosting the appeal and quality of studies at Universität Hamburg by developing modern academic programs. This includes the following strategic areas of activity:
(1) Digital and Data Literacy Education (DDLE)
(2) Improvement of the course catalog
(3) Internationalization
(4) Life-long learning

Life-long learning
Increasing teaching quality and teaching innovation through needs-based consulting, support, and qualification services for teaching staff. This includes the following strategic areas of activity:
(1) Overview of consulting, support, and qualification programs
(2) Improvement of consulting, support, and qualification programs
(3) Motivating conditions

Goal 3
Boosting student satisfaction through user-centric digital processes and infrastructures throughout the student life cycle. This includes the following strategic areas of activity:
(1) Systems, tools, and services
(2) Processes and standards
(3) Teaching, learning, and living spaces
(4) Examinations

Goal 4
A fourth strategic goal cuts across all three of the above goals and states: increasing equal opportunity, diversity, and equal and accessible participation through comprehensive and consistent consideration of diversity factors. There are no formulated strategic areas of activity for this goal.

To the figure

FIGURE 6: STRATEGIC GOALS AND AREAS OF ACTIVITY AT UHH IN ADMINISTRATION

This figure is titled “strategic goals and areas of activity in administration“. The headline reads „smart administration in the digital age“. The figure is divided into four columns, each of which represents a strategic goal for digital transformation in administration. Each of the goals is divided into several areas of activity.

Goal 1
Increasing service recipients’ satisfaction by optimizing the service experience. This includes the following strategic areas of activity:

(1) User-centricity and service quality
(2) Quality standards for digitalization

Goal 2
Increasing employee effectiveness with support and qualification programs. This includes the following strategic areas of activity:
(1) Support-Portfolio
(2) Motivating conditions
(3) Qualification opportunities

Goal 3
Improving the working environment with needs-based infrastructures. This includes the following strategic areas of activity:
(1) Needs-based services and IT infrastructure
(2) Workspaces and workplace equipment

Goal 4
Improving governance with professional information and process management. This includes the following strategic areas of activity:
(1) Provision of management- and process-relevant information
(2) Digitalization of Universität Hamburg’s core processes

Goal 5
A fifth strategic goal cuts across all four of the above goals and states: smart administration through the establishment of a Competence Center for Digitalization and Digital transformation. There are no formulated strategic areas of activity for this goal

To the figure

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