Inspiration for the digitalisation of the Erasmus University Rotterdam

The State of Digitalisation

CIO Office
Erasmus Digitalisation & Information Services
7 February 2022

Erasmus University Rotterdam
Making Minds Matter

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Preface

I am proud to present the State of Digitisation of Erasmus University.

The Chief Information Officer, together with a team of i-professionals, mapped out the developments surrounding digitalisation. The vice deans of education and research have provided input on interim versions, and of course on behalf of the CvB I have been involved in this very exciting process from the start. After all, as a university, we continuously want to develop on the basis of what students and employees expect from the digital society and therefore also our role in it. Relevant developments within and outside EUR have been brought together in a clear manner. With inspiring examples and challenging statements, topics are made practical and concrete. This makes it clear that digitalisation is essential in everything we do in education, research and business operations, now and in the future. Which developments are relevant for the further realisation of EUR's strategy?

The State of Digitalisation provides a guideline for entering into a discussion together. About possibilities and opportunities, but also about undesirable developments. In the newspaper article "Digitalisation threatens our university. It is time to draw the line" (Volkskrant, December 22, 2019) the rectors already argued for joint leadership. Since then, that question has only become more urgent. It is becoming increasingly clear that digitalisation is not only facilitating. It is also transformative in nature; it fundamentally changes the way we conduct and support education and research. Think, for example, of the use of artificial intelligence in education, making research data accessible to society, or the development of the university into a network organisation.

All these developments can bring a lot of positives. They do need guidance from the primary process and our Erasmian core values. With the State of Digitalisation as a guideline, we will enter into discussions in the coming period. How can we improve in this area and, in accordance with our value 'connecting' use digitisation for its benefit? What is expected of us? And important: what can we and what can we not promise? Together with all those involved, we make the best possible choices for the digitising EUR of tomorrow.

On behalf of the entire Executive Board, I wish you a lot of inspiration and reading pleasure,

Ellen van Schoten

Ellen van Schoten

Introduction

The influence of digitalisation is noticeable in all areas within the university. Both the theoretical as well as the empirical questions and the way in which these are addressed within research and education are changing strongly as a result of the possibilities of digitalisation.

Research questions in which digitalisation play an important role are being investigated, for example, within the Erasmus Initiative "Societal Impact of AI". Within this multidisciplinary theme, research is conducted into the effects of applying Artificial Intelligence (AI) in work, healthcare, communication and even art and culture. Research into these topics is supported by researchers and staff of the Erasmus Center for Data Analytics, Erasmus School of Social and Behavioral Sciences, Erasmus School of Health Policy & Management, and ErasmusX.At the same time, the research within these themes also indicates that the way in which research questions are addressed is changing. The major challenges of our time (e.g. climate change, aging population, urbanisation) are not easy to solve within the separate scientific disciplines. Collaboration with other schools, knowledge institutions, social institutions and companies is necessary to create a meaningful, positive societal impact.

Digital tools can support this research process and sometimes radically change it. This global digital transition of the research process is embraced in the "National Plan Open Science" (NPOS 2017). Open Science represents an enormous cultural shift for all those involved in the research process. In open science, the common practice is shifting from publishing research results in scientific publications to digitally sharing all available knowledge at an earlier stage in the research process. By enabling everyone to easily become acquainted with the research questions and the results, the transparency and quality of the research process increases. As a result, knowledge exchange and development can take place more quickly and the innovative capacity of all institutions involved can further increase. For researchers, this also means more opportunities to publish and therefore more publicity.

Within education, the digitalisation of the labor market is causing a rapidly changing need for training. New businesses and services are developing at a rapid pace, making existing professions less relevant and new ones appearing. This means that education must prepare students for a labor market that is in full transition. At the same time, education is also expected to develop an offer for their alumni to ensure that their knowledge and skills continue to match the changing needs of employers and society. Strategically smart technological choices can ensure that current education is offered to diverse groups of learners, with different needs, knowledge and skills.

In short, digitalisation is of great importance for both research and education at EUR. The agility, efficiency and effectiveness of business operations can also increase significantly. By far-reaching harmonisation and digitalisation of work processes, and by training employees, the university can support and strengthen both internal and external initiatives by lecturers, researchers, students and alumni.

The State of Digitalisation is written based on the craftsmanship, experiences and proactive attitude that can be expected from the CIO-Office. Proposals are made for the use of innovative technologies that can contribute to the positive social impact the EUR wants to achieve. The aim is to inspire all EUR colleagues (board members, deans, directors, management and staff) about the possibilities of digitalisation and to subsequently make joint choices about the best possible support for the research and education of our university.

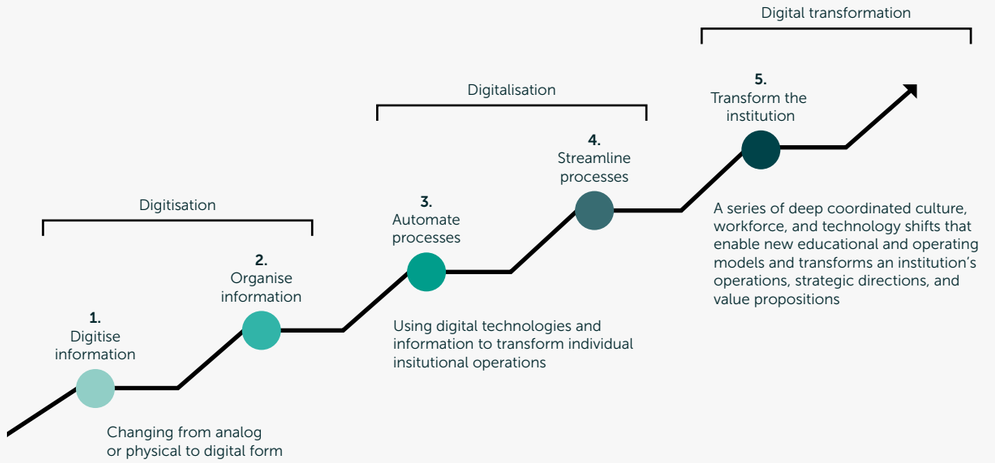
What do we mean by "digitalisation"?

Originally, digitalisation had only one meaning, namely the process of converting physical data into digital data. For example, scanning a document such as an invoice or registration. However, the term digitalisation has taken on more meanings, including the digitalisation of processes. Because data is available digitally, processes can be designed more efficiently. By digitising processes, companies are changing the services they offer and the way they interact with their customers.

What then is "digital transformation"?

We speak of a digital transformation when digitisation leads to a fundamentally different way in which a sector functions. Effects of the digital transformation are visible in many sectors such as music (e.g. Spotify), transport (e.g. Über), food (e.g. home delivery), travel (e.g. Expedia) and lodging (e.g. AirBNB). Companies arise that offer new services based on user data and thereby tap into new revenue streams, often at the expense of companies that did not (or cannot) take this step in time. Figure 1 shows the development of digitalisation in model form (Reinitz, 2021).

Figure 1. **Reinitz (2021). Schematic representation of digitisation developments**



Inspirational example:
Digital transformation in the music industry.

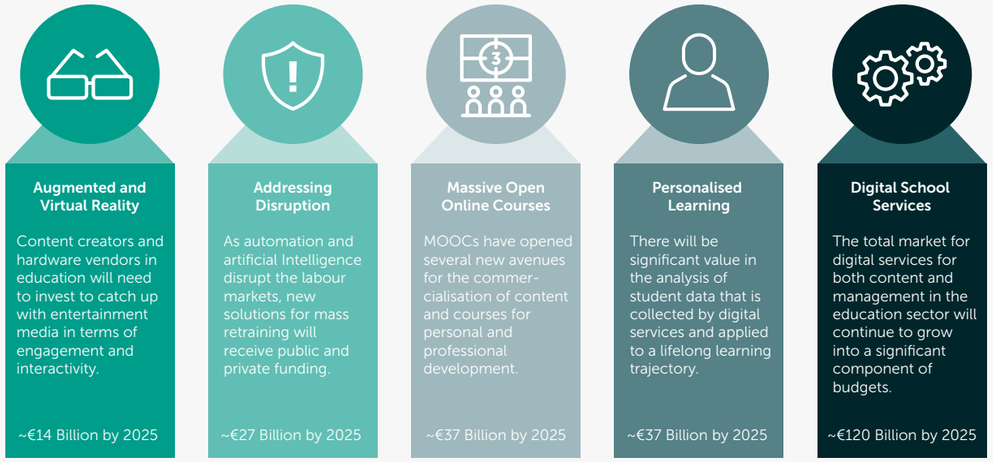
Digitalisation made its entrance in the music industry in the early 1980s with the introduction of CDs. The effect was very big for the listener and at the same time very modest for the industry; the music stores used to have a separate corner where customers could buy CDs. That corner gradually became larger until the CDs took over all the space of the records and customers could still choose records in a small corner. The introduction of CDs led to a new way in which music was offered, but did not change the service or the way money was made.

That only happened after digital music could be offered via the Internet. This allowed music to be multiplied and distributed almost free of charge. Usage data also became available that made it possible to analyse choices of individual users. It was specifically that last step that transformed the music industry because it completely changed the service and the revenue model! New providers, such as Spotify, arose with knowledge and insight into customer behavior and preferences, thereby supplanting the regular record stores.

Stolze, J. (2018).
Algoritmisering, wen er maar aan!

Naturally, the university cannot escape this global development. Education is more sensitive than research to new providers who, by means of personalised services, take away part of the available financial resources from the public sector. The top 50 universities in the Times Higher Education rankings have significantly expanded their market share in online education in recent years (Beulen, 2021). At the moment, there is still a premium price to pay to access their courses. In order to identify and bind the best students worldwide to these Top 10 Ivy League universities, it is quite conceivable that the digital content of one or more of these institutions will be made available for free. Large commercial players, including the "Big-5" (Meta, Microsoft, Apple, Google, Amazon) are also increasingly targeting the growing education market. The digital transformation in education will enable faster access to quality education, according to research and consulting firm Frost and Sullivan (CSC Europe, 2017). They estimate that global investment in digital education will increase to 235 billion euro by 2025. An overview of the categories in which investments are being made is shown in Figure 2.

Figure 2. **Estimation of investments in digital education by Frost and Sullivan**



In many cases, the offer of the renowned universities cand commercial parties can compete with, and supersede, the offer of the Dutch universities, which raises the question of the value of the current offer of the universities.

In addition to increasing competition and the development of lifelong learning in an attractive growth market, the preferences and expectations of students are also changing, for example, with a profound demand for personalisation. By responding in due time, these developments do not necessarily have to be a threat and can also be used to strengthen the earning capacity and/or the public task of higher education. At the request of the acceleration plan "Educational innovation with ICT", Drift has drawn up the report "Learning digitalisation" in which they describe directions in which digitalisation can be used as a crowbar for a *desired* transformation (Acceleration Plan, 2021). The core of this goes back to the original intention of higher education: to stimulate curiosity, to encourage academic and social development and to provide access to all knowledge in the world.

Based on these core values in education, they paint a picture for a future-proof higher education in which:

1. The intrinsic motivation and curiosity of the learner is central.
2. Each student is given the opportunity to go through a learning process that matches his/her unique profile as closely as possible.
3. Learning is not tied to a particular stage of life, education, or institution.
4. Boundaries between education and the labor market are blurring and continuous learning between society, the labor market, learners and lecturers is possible again.
5. Lecturers work in teams, both within and between institutions.
6. Teaching materials are developed "openly" and are available to everyone.
7. Digitalisation opens up learning to anyone who wants to, with countless new possibilities both physically, blended and online.

Many of these objectives are reflected in EUR's 2024 strategy, which is why these objectives are further elaborated by various initiatives that are named in the State of Digitalisation. Of course, each initiative individually does not create a "digital transformation". But a coordinated approach, steered from the primary process, can indeed be a very important step in the right direction.

Inside-out and outside-in perspectives combined

In the State of Digitalisation, an inside-out perspective is enriched with an outside-in perspective. The inside-out perspective ensures that the digitalisation topics are explicitly in line with the strategic goals and ambitions of the Erasmus University. The outside-in perspective ensures that external opportunities and developments are identified at an early stage and can be included in EUR's digitalisation strategy.

Inside-out perspective

The EUR strategy 2024 has been included in the State of Digitalisation as a compass for its content. At the end of each paragraph, relevant EUR's strategic goals are listed separately next to the compass icon.

The EUR strategy thus gives direction to the subjects and ambitions that are mentioned in the State of Digitalisation. In addition, a careful inventory has been made of relevant strategic projects that have recently been realised or are planned within the schools or the EUR. These projects are indicated by two icons:

selection of completed projects that are ready for celebration of its results and succes.

selection of strategic projects that are planned.

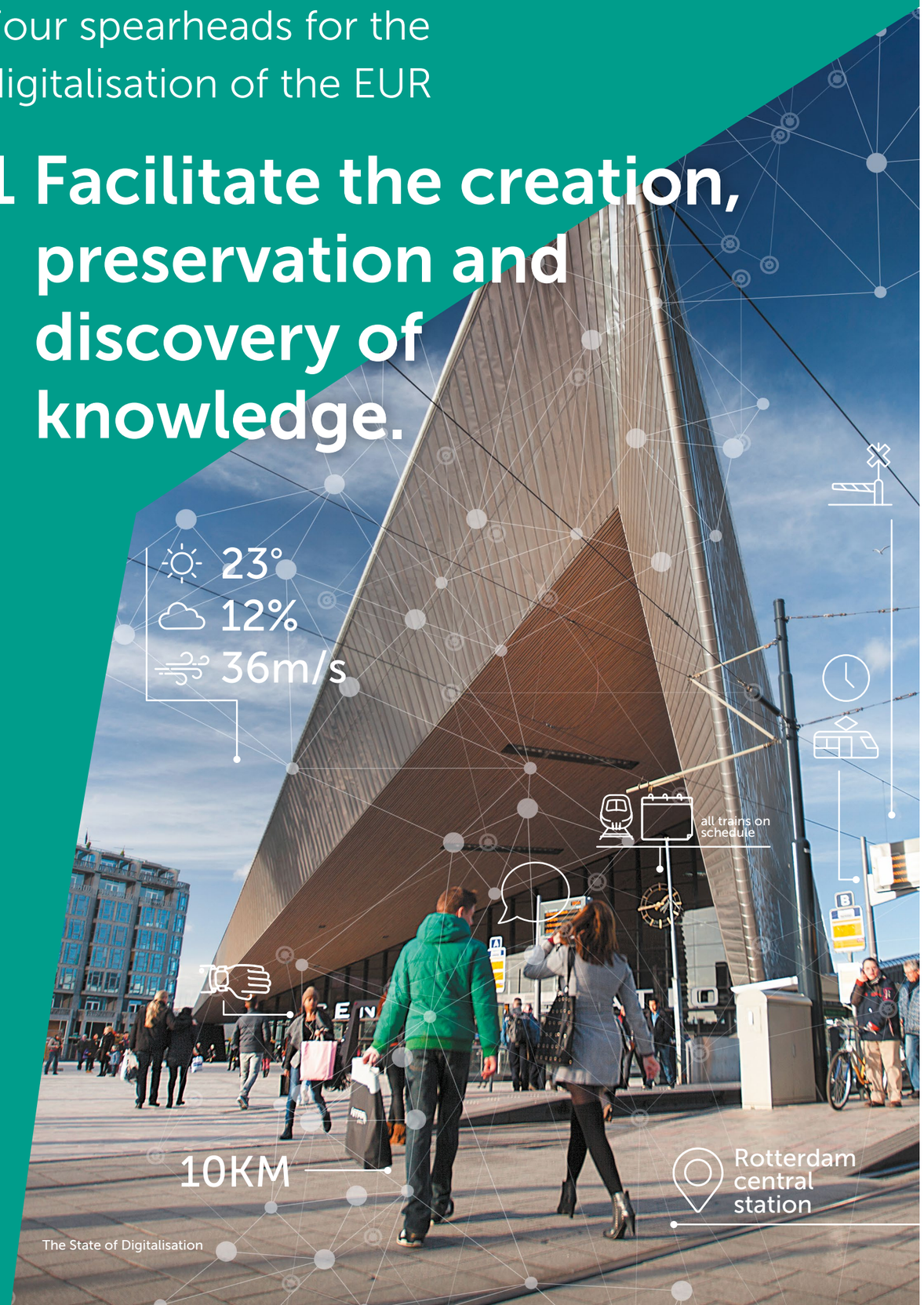
Outside-in perspective

In the State of Digitalisation, the outside-in perspective has been added deliberately and well-advised. A thorough analysis was made of the strategic plans of the other Dutch universities, advisory reports from the sector, as well as reports and articles on social and technological developments. The result is incorporated in a structure based on the digital strategy of the University of Oxford (Oxford, 2021). Independent of the specific goals that have priority in a certain strategic period, this structure gives meaning to the use of digitalisation within each research university. Combined with EUR's strategy, it offers a further deepening of the answer to the central question of why the described digitalisation topics are important and what goal(s) it can help achieve. For completeness, the structure of the EUR strategy for 2024 including the relationship with the digitalisation topics is also included, this overview can be found in Appendix 1.

Finally, each paragraph ends with a suggested topic for further strategic dialogue. If a topic is given strategic priority, it can be further elaborated in an architectural impact analysis and a programme plan.

Four spearheads for the digitalisation of the EUR

1 Facilitate the creation, preservation and discovery of knowledge.



Central to EUR's strategy is the mission to create a positive social impact. Traditionally, the university has made a contribution from a monodisciplinary perspective, somewhat detached from society. However, modern social problems have become more complex and society demands greater involvement from the university. More multidisciplinary collaboration and new working methods are needed in order to create a greater impact. Building on university's strengths, EUR's strategy 2024 opts for expanding the current core activities with design-oriented thinking in order to embed societal validation in research and education. By means of design-oriented, multidisciplinary and interactive work, creative and innovative solutions can be found for complex social issues.

Inspirational example: ***Design Impact Transition platform***

The Design Impact Transition (DIT) platform brings together academics, students, non-academic staff and external stakeholders around complex and persistent societal challenges. The aim is to achieve university-wide fundamentally different ways of thinking and acting from a transdisciplinary philosophy by using design methods, action research and co-creation with social partners.

Derk Loorbach (2021)
Launch DIT platform

1.1 Enable new modes of research especially across disciplines

1.1.1. Acquisition of budgets

It is quite a task for researchers to gain a good overview of project proposals with external funding. Many have their personal selection of websites and rely on their network to see relevant project proposals in a timely manner. There is as yet no comprehensive overview for all researchers. However, such an overview is preconditional, especially for researchers who, consider to, conduct multidisciplinary or interdisciplinary research because their disciplinary overviews are often insufficient.

Selection of current or planned projects
- ERS, CPC, Finance and EDIS[1]: registration of research projects to enable central support and tracking of applications.

Action: Designing possibilities for improving the overview of externally funded project proposals for both disciplinary and multidisciplinary research with (vice-)deans of research, Academic Affairs, ERS, and the UL.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Superior support for researchers.*

Strategic dialogue: This topic is part of the strategic theme *Research Funding.*

1.1.2. Drafting and reviewing research proposals

When writing research proposals, researchers should take into account guidelines from subsidy providers and various areas of expertise, including ethics, privacy, security and data management. In the case of externally funded research, guidelines from the subsidy provider may be added. The current availability of practical instructions and guidelines can be improved. After the researcher has processed the relevant information, there is then a lot of duplication in having the draft research proposal reviewed because the review systems work independently of each other. Valuable researchers' time is saved by linking these systems. This is also an additional complication in multi- or interdisciplinary research, which will increase the return on this investment.

1 For the sake of readability, (sub)departments or schools are referred to by their acronyms. Appendix 2 contains an overview in which acronyms are written out in full.

Selection of current or planned projects
- ERS, UB, ESSB and EDIS: Supporting the ethics, privacy, security and data management work processes to avoid duplication and save time.

Actions:
- Designing and implementing integral information provision regarding ethics, privacy, security, data and document management together with AA, ERS and EDIS.
- Design options to streamline review process and support organisation with (vice) deans of research, Academic Affairs, ERS, and EDIS.
- Design links between the review systems for ethics, privacy, security and data management with the technical and functional managers.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Superior support for researchers* and *Open and responsible science*.

Strategic dialogue: This topic is part of the strategic theme *Research Administration*.

1.1.3. Digital collaboration

To set up multi- and interdisciplinary research, researchers need a digital environment that can support them in collaborating with other researchers. In the coming year, national efforts will be made on a self-service platform with which researchers can put together their own research environment(s). They can do this, among other things, on the basis of templates. In addition, they are given the opportunity to add unique functionality (e.g. analysis software) themselves. Colleagues and other stakeholders (inside or outside the institution) can then be invited and gain access to the entire environment or parts of it. As with many other research facilities, EUR will meet this need in line with the national infrastructure being developed by SURF. Researchers indicate that they currently have little overview of the tools that are available nationally. In addition, they indicate that the current privacy and information security policies have not been sufficiently translated into practical guidelines about what they are and are not allowed to do in these environments.

Inspirational example: ***anDREa (a digital research environment)***

With anDREa, researchers can work on their research in a safe environment. This scalable environment contains everything they need, such as data and analysis tools. But it is especially nice that you can easily work together, also with people from other (international) organisations. And this without having to worry about privacy and security, because that is well arranged.

Marc Remmers,
Information manager EMC

Selection of finished projects
- UL and EDIS: Implementation of *Overleaf* allowing researchers to collaborate in *LaTeX files*.

Selection of current or planned projects
- ERS, UL and EDIS: Up to standard. This provides insight into which tools are available for research data management and which are best used for what.
- ERS, UL, EDIS and all faculties: Improving the research workplace. This project aims to implement substantial improvements in the workplace of all researchers.
- ERS, UL, EDIS and all faculties: Virtual research environment (VRE). A VRE is a digital environment in which researchers work together on a project. In a VRE, the availability of data and computing facilities is essential.

Actions:
- Optimising information provision on nationwide research tools together with ERS, EDIS and the UL.
- Designing Virtual Research Environments (VRE) and support organisation with (vice) deans of research, ERS, EDIS and UL, including consideration of the use of SURF VRE.
- Initiate visioning and design a support process so that all requests for access to i-services and i-tools can be quickly assessed and offered via the researcher portal with (vice-)deans of research and EDIS.
- Initiating designing reports on the use of all i-tools and i-services that are offered via the portal with (vice) deans of research and EDIS.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Superior support for researchers*.

Strategic dialogue: This topic is part of the strategic theme *Research Administration*.

1.2 Promote new ways of generating, curating, and engaging with data

1.2.1. Support Organisation

For many researchers, obtaining and analysing data is central to their research. In doing so, they need support during every phase of their research. One could think of support in (1) obtaining, (2) enriching, (3) analysing, (4) storing, (5) sharing, and (6) archiving data. Various digital tools are available for all these stages, each with their own strengths and weaknesses.

Inspirational example: ***Love is in the air!***

The Erasmus Behavioral Lab supports interdisciplinary research into behaviour. It is a partnership between ESSB and RSM and provides about 50 rooms with measuring instruments in different setups to collect and analyse data. Last year Valentine's Day, the "Erasmus Love Lab" was added. This is a unique research lab in which researchers combine their scientific expertise in the field of research into intimate relationships, love and sexuality. A look inside the Erasmus Love Lab is available at https://edu.nl/ax8dg

Mladen Acinger (2022)
Manager Erasmus Behavioural Lab

Since last year, support has also been made available through the faculty-appointed data stewards and the centrally set up Digital Competence Center (DCC). For both support structures it is still not entirely clear what exactly is expected from everyone involved and who is responsible for what. Also, not everyone has comparable knowledge and skills (NPOS 2021). As a result, a further development step is required both within EUR and other institutions in order to match the quality of the support to the needs of the researchers. The Research Datamanagement program will work on this together with the National Coordination Research Data Management (LCRDM). In this way we also ensure that the DCCs of different universities can learn from each other.

Inspirational example: ***Datastewards are essential***

"More and more faculties are working interdiscinterplary and there is a growing need to use data sets from different angles. The expertise from data managers is essential in many types of research and shouldn't be invented again every time. Uniformity in data management and providing access to research data are needed. We must keep up with international initiatives like FAIR."

Prof. Dr. Chantal Kemner (2019)
program director YOUth-cohort (UU)

Selection of finished projects
- ERS, UL, EDIS and all schools: Introduction of data stewards to support researchers in the field of data management.

Selection of current or planned projects
- ERS, UL, EDIS and all schools: Further professionalise the DCC, including setting up a helpdesk for RDM.

Action:
- Discuss needs and possibilities for further development of data stewards and DCC in collaboration with LCRDM with (vice) deans for research and ERS.
- Discuss desirability and opportunities to open up infrastructure, support and professionalise students in data skills with (vice) deans education, ERS, UL, and EDIS

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Superior support for researchers*.

Strategic dialogue: This topic is part of the strategic theme *Research Delivery*.

1.2.2. Obtaining and enriching data

Researchers can generate and collect data themselves, or use countless (open) datasets from all kinds of fields that are available through data archives or repositories. Knowledge about which repositories there are, gaining access to these repositories and the secure sharing of obtained datasets is often still an individual matter. Researchers indicate they would appreciate extra support.

Selection of finished projects
- EDIS, ERS, ESSB: Beats: Provide video services under the highest security and privacy standards.
- Library: the EDCS has made various datasets available for EUR.

Action: Initiating a joint vision on the use of data repositories for discovering and securely sharing purchased, collected and processed research data with (vice) deans of research, ERS, EDIS and the UL.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Superior support for researchers*.

Strategic dialogue: This topic is part of the strategic theme *Research Delivery*.

1.2.3. Storing and sharing of data

Researchers are expected to store their data and analysis software in such a way that they comply with the FAIR principles for data storage. In other words, the data is later Findable, Accessible, Interchangeable and Reusable for others. Researchers indicate that they are enthusiastic about contributing to this, but at the same time they also see challenges that differ per scientific field (KNAW 2021). Various factors play a role in this, such as the reproducibility of data or the usability of data for other researchers. The general challenges the researchers see are data ownership, privacy and support for large amounts of data storage. The need for large storage capacity is also growing strongly within EUR. In particular, the storage of confidential data is an important point of attention. After the cyber hacks of several educational institutions, we can no longer be naive in the field of information security and we must collectively increase our digital resilience (people, processes and systems). Protecting data will always create "hassle" for researchers as hurdles or restrictions have to be taken before they can access their data. It is a joint search for the right balance to be as open as possible (striving for open science), and at the same time as closed as necessary (striving to be resilient to the digital threats). There is also a search for the right balance between the facilities that we want to develop within EUR for this purpose and the research infrastructure that is being developed nationally to continue to meet the increasing need for online and offline storage of data and computing capacity. One of the advantages of the national facilities is the potential reach that researchers have with their data. At a national level, the local Digital Competence Centers (DCC) will be connected to each other and to the *European Open Science Cloud* to enable sharing and enrichment of datasets beyond disciplinary, organisational and national boundaries. In addition to secure technical facilities for data storage, researchers indicate a need for software engineers to help them develop, set up, test and maintain databases and other large-scale data processing systems (KNAW 2021). It requires further coordination within EUR to determine whether the value these professionals can bring outweighs the necessary investments.

> *Inspirational example:* ***iRods/Yoda***
>
> **YODA works through iRODS as a kind of Dropbox, but much more secure. The researcher can work with the data on his workstation as it is a local disk., instead of the much more complex infrastructure that actually behind it.**
>
> *Ton Smeele, developer Universiteit Utrecht*

> *Inspirational example:* ***Urban Big Data***
>
> **Cities like Rotterdam are developing data platforms to integrate data-driven solutions with each other, this way data can potentially be easily shared between various applications. Since data collected for one application can also have value in other applications, this makes enabling efficient and rapid sharing of data between applications important. It can lead to new insights and services that can facilitate or accelerate urban innovations.**
>
> *Dr. Fadi Hirzalla (2021) Woorden ter inspiratie en daden*

Selection of finished projects
- ERS, UL, EDIS and all schools; SURF Researchdrive, with which researchers can store and share their data safely and easily.
- ERS, UL, EDIS and all schools: Figshare, with which the datasets are published.

Selection of current or planned projects
- ERS, UL, EDIS and all schools: iRods/Yoda. This system allows the researcher to manage his data. This across all research phases and independently of the underlying hardware platforms. The project thus touches on all FAIR aspects.

Actions:
- Recalibrate EUR-wide research infrastructure and guidelines for data storage that meets security requirements and FAIR principles
- Designing a range of multiple global services for storing and sharing data in the cloud with (vice-)deans research, UL and EDIS.
- Initiate joint visioning of support options for software engineers with (vice) deans of research, Erasmus Research Services (ERS), UL, and EDIS.
- Connecting the DCC EUR to the European Open Science Cloud with ERS.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Superior support for researchers* and *Open and responsible science*.

Strategic dialogue: This topic is part of the strategic theme *Research Administration*.

1.2.4. Analysing data

The amount of available data is increasing enormously. This creates new research forms and methods, such as recognising patterns in data from which research questions can arise. Not all researchers are equally familiar in working with Big Data and machine learning or deep learning analysis techniques. Supporting these new forms of research offers opportunities to enrich and accelerate research in a broad sense.

> *Inspirational example:* ***Digital Twins***
>
> **To understand the multifaceted dynamics in the Rotterdam delta, Resilient Delta is building a digital twin. In this digital reality, predictions can be made about the influence of a change in one place in the system, e.g. the reduction of fossil fuels in the port, on other places in the system, e.g. Rotterdammers with respiratory infections.**
>
> *Rob Zuidwijk, Opening Academic Year 2021-2022.*

> *Challenging view:* ***Quantum Computing***
>
> **Quantum computers can perform many calculations at once. As a result, they are able to solve difficult problems much faster than conventional computers will ever be able to. For example, a quantum computer can simulate the precise behavior of molecules so that new medicines, better batteries, more powerful fertilizers or healthier food can be developed. We are therefore at the beginning of a technological revolution that is expected to make a major contribution to solving societal challenges in the fields of energy, food, care and beyond.**
>
> *QuTech (2019) National Agenda on Quantum Technology*

Selection of finished projects
- Machine Learning has been used to show the social impact of publications, making use of the UN Sustainable Development Goals.

Action:
- Initiate joint vision development, support big data analysis and machine/ deep learning with (vice) deans, ERS, EDIS and ECDA.
- Improving communication and accessibility of national services such as the High Performance Computing (HPC) Cloud system from SURF Sara.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Superior support for researchers*.

Strategic dialogue: This topic is part of the strategic theme *Research Administration*.

1.2.5. Archiving data

After completion of each research project, it is important that the data is managed sustainably, among other things because of the traceability of the conclusions drawn in the publication(s) that are based on the dataset. Sustainable management of data turns out not to be easy for researchers because they lack a workflow and archiving system. Also, there is still a lack of policy and facilities for archiving unpublished data.

Selection of current or planned projects
- ERS, UL, EDIS and all schools: iRods/ Yoda is used to permanently archive data.

Action: Designing possibilities for archiving unpublished data with (vice) deans of research, ERS, the UL and EDIS.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Superior support for researchers* and *Open and responsible science*.

Strategic dialogue: This topic is part of the strategic theme *Research Administration*.

1.3 Extend the reach and effectiveness of scholarly communications

1.3.1. Visibility of researchers and their output

One of the ways in which the impact of scientific communication can be increased is through the visibility of researchers' work. In the past year, a lot of work has been done on the implementation of the first plateau of the new research information system *Pure*. An important reason to modernise this system is to improve the findability of publications. Moreover, more of the scientific work can be made available through open access and open datasets. In the coming year, we will continue to work on the implementation of the system on a plateau basis. New functionalities such as fingerprinting and linking to organisation and theme pages increase the chance that relevant scientific output will be found by interested citizens, fellow researchers, funders, etc..

Selection of finished projects
- ERS, UL, EDIS and all schools: Implementation Pure, as a replacement for METIS, for publishing scientific output.
- UL, EDIS and all schools: with the implementation of ORCID, every researcher has the possibility to get his own persistent digital identifier (ORCID iD).

Selection of current or planned projects
- ERS, UL, EDIS and all schools: Implement PURE portal. The Pure Portal gives the researcher profiling a boost.

Action: Further development of Pure research information system and support organisation within the program Research Data Management.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Superior support for researchers* and *Attracting top researchers worldwide*.

Strategic dialogue: This topic is part of the strategic theme *Research Publications*.

1.3.2. Exploitation of scientific insights

Another way to increase the impact is to actively apply findings in real life. Either by commercially making data available or exploiting developed insights. However, this turns out to be a difficult route for researchers because policy on rights, duties and responsibilities with regard to exploitation is complex and often not determined in advance.

Inspirational example: ***Power TAC***

The Power Trading Agent Competition (Power TAC) is a rich competitive simulation of future retail power markets. This simulation will help us to understand the dynamics of customer and retailer decision-making and the robustness of market designs, by stimulating researchers to develop broker agents and benchmark them against each other. This will provide compelling, actionable information for policymakers and industry leaders.

Prof. Dr. Wolfgang Ketter (RSM)

Inspirational example: ***Healthy'R (Center for Behavioral Research and Development)***

Since its start in 2017, Healthy'R has shown that it increases knowledge about changing health behavior within the municipality and among partners in the city. In doing so, it works on the issues arising from the municipality's policy assignments, specifically from Gezond010: the agreement. We translate project results into practical recommendations and advice for policy making and implementation, for example in workshops with stakeholders. Healthy'R has an impact by realising a transition to a more behavioral knowledge-driven policy practice.

Prof. Dr. Semiha Denktaş en dr. Paul Kocken (2021) Woorden ter inspiratie en daden

Selection of current or planned projects
- ERS and EDIS: Intellectual Property (IP) Management to simplify the management of IP.

Action: Initiate joint vision formation simplify exploitation of research results with (vice) deans of research, Academic Affairs, Legal Affairs and ERS.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Superior support for researchers* and *Attracting top researchers worldwide*.

Strategic dialogue: This topic is part of the strategic theme *Research Impact*.

Overview topics for strategic dialogue

This chapter describes a number of actions that fit within a number of larger themes. These themes could be put on the agenda for further exchange of views during the regular meetings of the (vice-) deans of research.

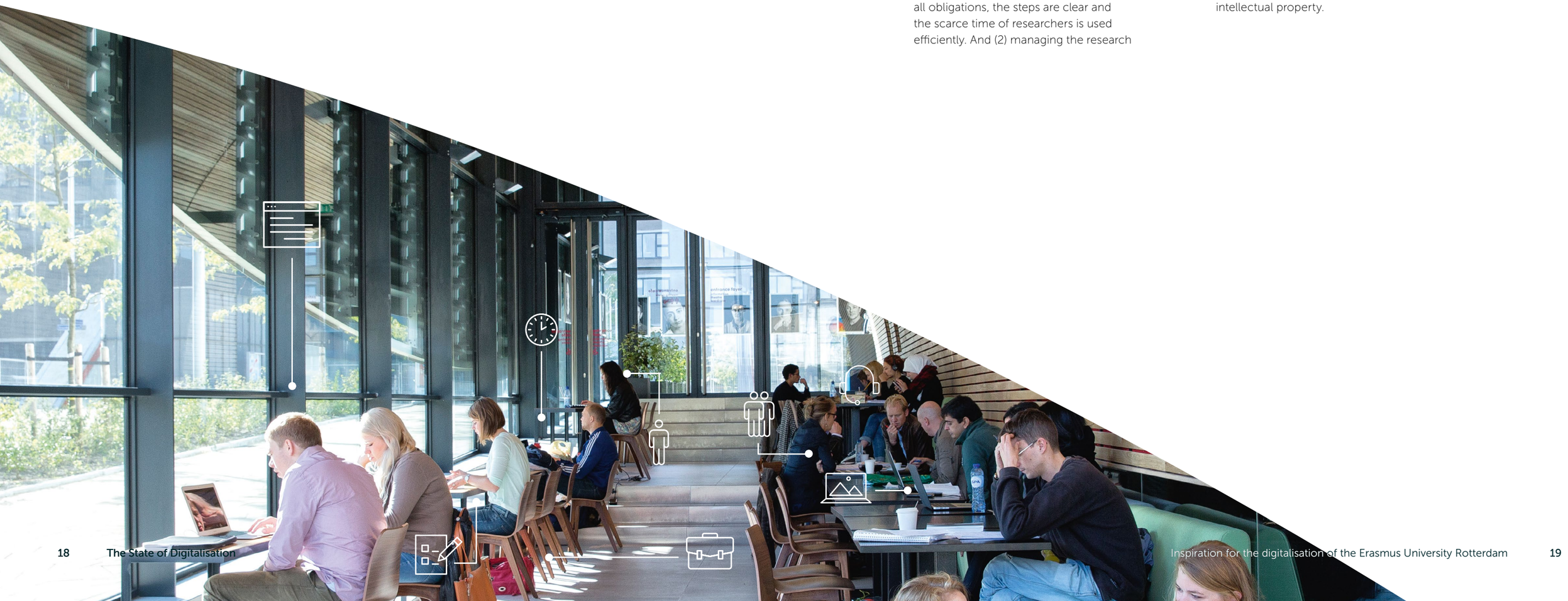
Research Funding: Managing the ability to identify and link external funding opportunities to researchers and research groups. This concerns the grant applications and the writing of offers, as well as the management of allocated budgets.

Research Administration: All activities necessary to support the research environment. This concerns (1) managing all rules and regulations in the research domain. This process covers all obligations, the steps are clear and the scarce time of researchers is used efficiently. And (2) managing the research infrastructure

Research Delivery: Managing the ability to do research. This includes managing the research outcomes, and ability to store, share, use and reuse datasets for research. Including curating, archiving and destroying datasets after the research project has been completed.

Research Publications: Managing and reporting on the ability to increase the findability and visibility of research output.

Research Impact: Managing the ability to maximize the impact of research by building relationships with partners. This includes managing the ability to realize the commercial potential of research results, including management of contracts and intellectual property.



Four spearheads for the digitalisation of the EUR

2 Improve utilisation and exploitation of knowledge.

2.1 Enhance teaching and research through effective use of digital technologies and data

Through the development of digital technology such as artificial intelligence, video applications, examination applications, e-portfolio systems, and edubadges, education can be further developed and major trends such as blended learning, design-oriented learning, online learning, hybrid education, personalised learning, and lifelong learning. Digitalisation can contribute to making education more flexible (less physical restrictions), more inclusive (new target groups) and more sustainable (less travel movements).

2.1.1. Study data & Artificial Intelligence

In recent years, EUR has actively participated in the national acceleration project "Safe and reliable use of study data". A number of first experiences and results have also been gained in the project "Learning Analytics @ Erasmus". As expected, study data appears to provide valuable insights to students, lecturers, student counselors, support staff, and management. A range of AI products is made available that can contribute to help increase the quality of the learning, courses, training and policy considerations. For example, students to receive automated, personalised advice on courses and learning materials that match their preferences and prior knowledge. Lecturers can receive support in identifying opportunities for improvement in their courses. Also, complete tasks can be automated such as answering questions, providing feedback on submitted assignments or assessing formative tests. And programs can gain insight into (less) successful student routes in their curricula. In short, the use of study data and AI can make a substantial contribution to achieving strategic goals such as increasing personalised learning, increasing study success and reducing work pressure. Nevertheless, the uptake of these new possibilities in EUR education has remained limited in recent years. This may have to do with the workload of recent years as a result of COVID. It may also be because of a limited amount of relevant knowledge and experience. In any case, the application and demand for the development of these types of products could use a strong boost.

Challenging view: ***A new kind of university***

Digital technology gives education a personal interface. Continuous support from a smart learning management system, understanding individual student requirements, assisted by chatbots, various layers of support, an online call centre. Every touchpoint, question, bit of information, tool, self-test, code, or simulation is relevant and adds value. All data points are registered in a personal vault, shared for analysis as and when needed through an all-powerful app on the phone of every Erasmian.

Peter Vervest (2021)
Fast forward digital
A new kind of university

Inspirational example: ***AI tool EUR & Rotterdam University of Applied Sciences wins educational "Oscar"***

Automated Feedback, an AI tool that was developed in collaboration with EUR and Rotterdam University of Applied Sciences, was awarded during the Reimagine Education Awards. These international "Oscars" for higher education reward initiatives that improve learning outcomes and student employability, thereby fundamentally renewing the educational landscape. It is a tool that allows students to receive automated feedback on their academic writing skills. The tool gives lecturers more time to focus on substantive feedback. Moreover, while writing, students gain direct insight into the quality of their work, and can make improvements and learn from them without the intervention of lecturers.

Wilco te Winkel (2021)
Information Manager Education EDIS

Selection of finished projects
- CLI, EDIS: Automated feedback with AI on academic writing.

Selection of current or planned projects
- CLI, E&S, EDIS, RSM, ESL and ErasmusMC: exploring possibilities and conditions for the implementation of an AI chatbot to support (1) lecturers during courses and (2) the organisation with answering frequently asked questions.
- CLI and EDIS: The EUR is participating in the national acceleration plan "Secure and reliable use of education data".

Action: Initiate visioning on the use of study data and AI in education with (vice) deans of education, CLI, BICC, and ECDA.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Personal and personalised learning.*

Strategic dialogue: This topic is part of the strategic themes *Teaching & Learning delivery* and *Student Assessment.*

2.1.2. Video applications

Due to the increasing use during the COVID pandemic, video has proven to be able to enrich the learning environment and add value to the learning process. Video can enrich the learning environment in all kinds of ways and thus add value to the learning process. For example, video can be used to inspire students and to activate their prior knowledge. It can also be used to produce knowledge by asking students to make a video in which they apply the acquired knowledge in practice. Or when reflecting on the material learned by asking students to record a situation in which they show their own development in the knowledge and/or skills they have acquired.

Inspirational example: ***Educational drama series Casa Loco***

How can lecturers keep online education fun and interesting for students? With the educational series Casa Loco by professor Ruben Houweling, lectures become a lot more exciting to follow. The series – largely made by students and for students – is used during the lectures of the master's degree in Employment Law and is intended to brighten up online lectures.

The professor uses short excerpts from the series in his lectures to provide insight into theoretical lecture topics as everyday problems. In addition to specific knowledge about the subject, students also learn more about broad, university issues such as inclusiveness, loneliness or student debt. According to Houweling, students learn more from beautiful, high-quality images. "They would rather watch a good YouTube production than a webcam."

Wietse Buijs (2021)
Information manager ESL

Given the rapid growth of video applications in education, a good video infrastructure with accompanying tools is essential (SURF, 2021). These tools should be easy to operate by lecturers as well as students and satisfy various emerging needs such as video editing or video uploading. In addition, the tools should support interactivity well and need to be interact with other tools in different didactic scenarios. This also increases the need for educational and technical support as well as lecturer training. The infrastructure must be such that students with a moderate internet connection can also participate in synchronous sessions or use the asynchronous video material. The metadata of videos should be done properly and as much as possible automatically, so that they can be easily found. And there should be a flexible rights structure, so that a distinction can be made between what is open, restricted or really closed. In addition, policies and frameworks should be established to safeguard the privacy aspects of video.

Selection of finished projects
- EDIS: Migratie video-opnames *Mediasite* naar *Panopto*
- CLI, ESL: Educational drama series *Casa Loco*

Action: Initiate joint visioning and ambition regarding video-based learning with (vice-) deans education, CLI and EDIS.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Ensuring our education is future-oriented* and *Lifelong learning.*

Strategic dialogue: This topic is part of the strategic theme *Teaching & Learning delivery.*

2.1.3. Online practical skills

One of the most difficult subjects to support digitally is the development of practical skills. Not all skills are suitable, but more than many can think. Attention to digital support for learning practical skills is not only important for students who cannot come to campus. It also gives students the opportunity to better prepare before coming to campus for physical education. Different forms (online training, extended reality, simulations, serious games) are distinguished in which digital support is offered for teaching practical skills.

1 Online Skills Training

Numerous training courses are available that support students in developing knowledge about skills and the way in which these are applied in practice. Think of learning to collaborate, conducting interviews, or design thinking. Students can then apply these skills in practice and ask others for targeted feedback. This can be done by writing a reflection report or an audio and/or video recording that is handed in digitally to a fellow student or lecturer.

Inspirational example: ***Rethinking Education in an international context***

In collaboration with three international partners from Chile, the United States and China, the HAN University of Applied Sciences has set up a module in which pedagogy students can discuss educational topics in an international group. Prior to the discussions, the students attend three seminars on critical thinking and asking critical questions. They then work in pairs on a plea for an adjustment in education in both countries. They do this on the basis of a comparison of the state of affairs in both countries. All students and supervising lecturers could participate in the meeting from home via Zoom. Space was respectfully given to, and interest was shown for each other's points of view, and there were thorough questions in all sessions. Students rated the meetings as particularly valuable. This project makes interesting international contacts possible for all students for professional training and personal development.

Ton Schoemaker (2021)
Think critically and ask critical questions about education

Selection of finished projects
- ESSB: Skills in Psychology (ViPs) consists of seven digital modules that allow students to practice professional skills they need for adequate psycho-diagnostics, including observation, ethics, and diagnostics.

2 Use of extended reality

Extended reality is an umbrella term for the full spectrum of technologies and human-computer interactions, ranging from fully virtual environments to environments that combine virtual elements with a view of the real world, i.e. , augmented reality or mixed reality. Virtual reality (VR) can be used to create realistic learning situations that would otherwise be difficult, impossible or dangerous to offer to students. With VR, students can explore freely and relive a learning situation several times from different perspectives, whether or not on the instruction of the lecturer. For example, VR is used to let students observe and manipulate objects in order to let them discover how the object reacts to different touches. There are also VR environments that enable students to watch experts perform professional tasks, such as performing a specialist operation. In some students, students can even practice their own debating skills in a special environment like the court room.

Inspirational example: ***SURF Innovation Challenge 2016-2017***

In the Developmental Problems course, students learn about children with severe multiple problems. In practice, it turns out that students are often quite impressed when they come into contact with this target group, which means that recognising and applying the theory takes a back seat. In addition, for some groups, such as severely autistic children, the presence of students acts as a disruptive factor. The lecturer wants to introduce the students to the target group and allow them to observe in a community, without disrupting the daily routine. The aim is to allow students to independently observe which behaviors they observe during daily activities in a safe and accessible way. The 360 degree video is first shown to students without instruction and then discussed afterwards. The lecturer then gives specific instructions about the behavior to be identified and the course of events, and the students review the recording again.

Radboud University (2016)
360 degree video in education experience it now

Using augmented reality and mixed reality, insightful learning materials can be created for topics where spatial awareness is important, or where reality needs to be enriched with virtual objects or information. Think of human anatomy or the visualisation of chemical structures. In short, extended reality can ensure that students are immersed in different situations. Since the situation feels real, emotions are evoked that are real. This ensures that the experiences they gain are more impressive and that they remember the material better.

Challenging view: ***The new internet: the metaverse***

A possible successor to the current internet is the metaverse. The big difference with the normal internet is that interested parties go from two-dimensional, flat pages, to a three-dimensional, spatial form. The metaverse can be defined as a simulated digital environment that uses augmented reality (AR), virtual reality (VR), and blockchain, along with concepts from social media, to create spaces for rich user interaction mimicking the real world. In that virtual world, participants can move and communicate, meet people, make friends, buy products, relax, find a job, participate in a virtual economy and buy a virtual house or other property. The first metaverses already exist, for example Fortnite, which was originally a shooting game but has now grown into a social platform, with its own currency and a huge community. Live concerts are also played by renowned artists that are only accessible through this platform. The development of the metaverse has received a strong boost after Facebook's announcement to build their own metaverse. Those plans are so extensive that Facebook's parent company has been renamed "Meta" to emphasize the importance of this move.

Niels Bergervoet (2021)
Domain architect EDIS

Selection of finished projects
- ESL: Virtual Reality in Courtroom: students can practice their debating skills in a virtual courtroom.
- ErasmusMC: VR app with instructional films for nurses who start working on a COVID unit from a different discipline. Nurses throughout the Netherlands can quickly gain experience with essential actions in corona patients.

3 Use of simulations and serious games

Games and simulations often offer interesting storylines, challenging assignments and rules to follow, which challenge students in an interactive way to frolic theory. Competition with other students can also be added with points, time limits, reactions to choices made, reflections with fellow students.

Challenging view: ***In love with serious games***

Simulating the future is at the heart of everything we've built as humanity, because that's how our brains work too. If we want to do something, our brain is already busy setting up all kinds of parallel simulations of it. The brain tries to make a prediction of what is to come. We decide what to do on the basis of these different simulations. We could not exist without our brain's capacity to simulate. Because the games tell people about the possible future, they get a better idea of how their actions can change the situation. That is why they naturally also gain more self-confidence to put their knowledge into action in practice.

Ivo Wenzler (2021)
Education and research are improved by serious gaming

Selection of finished projects
- RSM: Dilemma game app supports researchers in developing their moral compass by defending and discussing dilemmas in the context of a critical dialogue. The app recently received a Council of Europe award as Best Practice for promoting scientific integrity.
- ErasmusMC: AbcdeSIM is a serious games and simulation environment that enables doctors and nurses to practice stabilising patients during emergency care.
- EUR: Game app offers students with a question-and-answer game an opportunity to test learned material. Includes opportunities to compete with fellow students.

Action: Inventory of need for support for online practical skills with (vice-)deans education, CLI and EDIS.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Ensuring our education is future-oriented* and *Lifelong learning.*

Strategic dialogue: This topic is part of the strategic theme *Teaching & Learning delivery.*

2.1.4. Design applications

Finding creative and innovative solutions is central to design-oriented education and research. This can be within the walls of the institution, but also at the place where the design will be used. It is desirable to have a whole suite of tools available to use alternately during the different phases of the assignment; research, ideation, or realisation. During the:

- *Research phase,* interviews with users and stakeholders are often used. Observation techniques can also be used, and participatory sessions can be organised. Findings are recorded in, for example, research notes, diaries, or empathy maps that can reflect the thoughts and feelings of those involved. Graphical overviews can also be made of, for example, ecosystems, stakeholders, processes, or journeys.
- *Ideation phase* many different methods can be used ranging from brainstorming, mind mapping, 'Thinking hats' or 'What if' questions. Stories and scenarios can also be used to help those involved to imagine the future and visualise concepts.
- *Realisation phase* prototypes can help by concretising designs and making them testable. These prototypes can consist of stories, narratives, role plays, scenarios, or visual representations.

Inspirational example: ***Storytelling revisited***

We have been telling stories since time immemorial. It is a way of giving context to a message in a form that emotionally connects with the audience. Instead of lists of findings, stories can add urgency, authenticity and personal involvement. Shorthand is an application that enables users to tell strong visual, auditory, and interactive stories without the involvement of designers or developers.

Actions: Inventory of need for applications to support the different designphases with (vice) deans of education and research.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Ensuring our education is future-oriented* and *Embedding excellent academic research in society.*

Strategic dialogue: This topic is part of the strategic theme *Teaching & Learning delivery* and *Research delivery.*

2.1.5. Digital testing and alternative forms of examination

Prior to COVID, the schools were already gaining plenty of experience with taking tests digitally. The accumulated experience, support organisation and infrastructure turned out to be decisive for safeguarding the continuity of education, because this also meant that exams could be taken at students' study addresses. Digital testing has taken off to such an extent that it was difficult to imagine and organise to go back to paper at the beginning of this academic year. We have therefore worked hard to scale up the facilities in the exam hall to sufficient laptops to be able to test large Ba-1 courses in one go. In the coming years, skills testing will still have to be administered in separate computer rooms. We expect however, that technological developments will make it possible in 3 to 4 years, to take all tests (knowledge and skills), under controlled conditions, on the student's own laptop.

Inspirational example: ***Proof of Concept SURF and UvA with Virtual Exam Workplace***

SURF and the UvA have developed a Proof of Concept (PoC) of a virtual examination workplace. In this environment students can safely take an exam on their own laptop and use all necessary software without having to install and configure it beforehand. The PoC showed that the cloud components have the potential to create a safe and flexible virtual examination workplace. SURF will further develop this PoC into a service together for all educational institutions. A market survey will take place in the coming months to see whether there are market parties that can and want to provide this virtual test workplace.

SURF Special Interest Group
Digital Assessment (2021)

During COVID, not all programs switched one-on-one from paper to digital exams. Some have turned to alternative forms of examination such as open book or oral examinations.
This reorientation on the role and method of assessment in education has also received a strong impulse during the lockdowns. More and more study programs are looking at designing the testing program based on the principles of programmatic testing. The results of tests and feedback during a longer period form the data points on which the summative decision to award credits is based (HU 2020). EUR currently does not have a central student portfolio system designed to collect these data points. Together with the CLI, the learning innovation managers and information managers, it will be discussed whether there is a need for a joint student portfolio system.

Inspirational example: ***Programmatic assessment Medicine Maastricht University***

Traditionally, testing in medical education has mainly focused on knowledge and skills, with final tests after each internship, which must be concluded with a pass. For our new program we wanted the focus to be more on developing and assessing (generic) competencies. Throughout the master's degree, the student's competence development is stimulated and monitored through frequent direct observation and feedback of situations in the workplace, through feedback on specific assignments and through (knowledge) tests. This creates a rich and varied picture of development across all internships, on the basis of which well-founded decisions can be made about progress. Every internship is no longer concluded with a grade or qualification. This change is not easy and requires a culture change in which the testing system is no longer focused on assessment but on learning. We now regularly receive positive feedback from students who have graduated in this system.

Beckers et al. (2021). Maastricht introduces a comprehensive assessment

Selection of finished projects
- CLI, E&S and all schools: European tendering process and implementation of digital testing system *ANS* and online proctoring tool *ProctorExam*.
- CLI, ESE, RSM, ESSB, EUC: European tendering process and implementation of practice and learning environment for mathematics, statistics and accountancy *Grasple* and *Sowiso*.
- E&S and EDIS: Scaling up examination infrastructure to 1250 chromebooks.

Selection of current or planned projects
- CLI, ESL, ESHCC, ESSB: Pilot portfoliosystems *Portfolium* and *PebblePad* to gain experience and articulate functional requirements potentially for a European Tendering process.

Actions:
- initiate joint vision development of student portfolio with (vice) deans of education and the Community for Learning and Innovation.
- Design a virtual examination environment with (vice-)deans of education, E&S, and EDIS.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Personal learning, personal leadership* and *Lifelong learning.*

Strategic dialogue: This topic is part of the strategic theme *Student assessment.*

2.1.6. EduBadges

EduBadges provide new opportunities to recognise and value the development of students, lecturers and employees. In addition to the formal course credits and the diploma, programs can choose to use EduBadges in different scenarios that vary from excellent performance on an assignment, internship or thesis to special efforts of a student (board year, excellence awards) or extracurricular activities. For lecturers and employees, EduBadges can give recognition to the successful completion of courses, an accomplishment that is normally given little visibility. Given the strong visual appearance of these badges on social media (e.g. LinkedIn) both the recipients and the issuers of these badges are expected to receive extra attention. Preparations are currently being made by OC&W, DUO and Studylink to use EduBadges in formal education for courses to which ECs are associated.Many of the preconditions (technical platform, privacy, security, marketing) for using EduBadges within EUR have already been fulfilled. This academic year, the CLI is exploring the possibilities of, and concerns about, the use of EduBadges within EUR. This exploration phase is concluded with a project plan, business case and roadmap for setting up this new service within EUR. This facility fits nicely as a form of recognition in the context of personalised and *lifelong learning.*

Inspirational example: ***Experimenting with Lifelong Development and Microcredentials***

Microcredentials are certificates for partial units. They are small in size with recognizable and recognizable value. The pilot with Microcredentials aims to ensure that the Lifelong Development offer of the institutions is given a clear value in the system, as is also the case for, for example, bachelor's and master's education.

Drift (2021) Learning digitalisation

Selection of finished projects
- EDIS: Connecting EUR to national infrastructure SURF EduBadges.

Selection of current or planned projects
- CLI: Exploration of the use of EduBadges in education.
- VSNU, VH, SURF, OCW, ISO, LSVB: Pilot micro-credentials in higher education.

Action: Facilitate joint vision formation for (vice) deans education, CLI and E&S.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals Personal learning, personal leadership and *Lifelong learning.*

Strategic dialogue: This topic is part of the strategic theme *Student Completion & Graduation.*

2.1.7. Blended learning

With the introduction of the digital learning environment in 2001, experience has been gained with "blended learning" in which students are offered a mix of physical and digital learning activities and learning content. In many cases, however, it concerns a mix in which the physical and digital worlds are barely attuned to each other. Due to the rapid technological developments and the availability of more and more different digital tools, blended learning an increasingly better coordination is expected of physical and online learning activities (Last & Jongen, 2021).

There is no single blueprint and practice has countless different combinations. It is not easy to design and maintain blended learning. Designing a course in which learning outcomes are well elaborated in appropriate learning activities, test format(s) and ICT support takes time and expertise that is often scarce. The use of blended learning requires didactic and technical skills that lecturers not always have. Poorly designed and implemented blended learning has negative effects for education, such as reduced motivation, declining results and frustrated lecturers as well as students. Adequate technical and didactic support and professionalisation of lecturers is therefore essential. By collaborating in teaching teams and sharing knowledge, supported by educationalists, it is possible to arrive at a good design faster without reinventing the wheel over and over again.

Selection of finished projects
- CLI and Risbo: Developing Microlabs for lecturers with short how-to modules on specific didactic issues.
- CLI and Risbo: teachEUR is a website for lecturers with an overview of teaching methods to make education more interactive.

Action: Initiate a joint vision on blended learning with (vice) deans of education and CLI.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Ensuring our education is future-oriented.*

Strategic dialogue: This topic is part of the strategic theme *Teaching & Learning delivery.*

2.1.8. Design-oriented education

In design-oriented education, students work together in multidisciplinary teams on authentic assignment. The assignment can come from university stakeholders (business and society), from scientific research, or from students themselves. These are often open assignments that students will investigate without a prescribed method. They design a solution and validate it in practice. The role of the lecturer changes to that of a coach that supports the learning process, inspires students and encourages reflection. In this type of education, more emphasis is placed on student interests, intrinsic motivation and the relationship with (professional) practice. With design-oriented education (and research), EUR aims to solve social

problems in a creative and innovative way and thus feed the business community, find solutions for social issues and contribute to greater prosperity.

Inspirational example: ***Working on global innovation @ NHL Stenden***

With Design Based Education we anticipate on a changing world and challenges around us. By collaborating intensively with professional practice, we connect with current issues and prepare our students for working in practice. The educational concept offers lecturers opportunities for more multidisciplinary collaboration with professional practice. It fits with our vision that our education and research make an important contribution to personal development and social progress. At the end of this strategic period (2024), Design Based Education is developed and implemented university-wide within all(!) courses from associate degree to masters.

NHL Stenden (2019). Strategisch instellingsplan 2019-2024

Action: Initiate visioning on online-only education with (vice) deans education and CLI.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Ensuring our education is future-oriented.*

Strategic dialogue: This topic is part of the strategic theme *Teaching & Learning delivery.*

2.1.9. Online-only learning

Fortunately, the switch to online-only education during the COVID lockdowns was achieved quickly thanks to the enormous commitment of lecturers, support staff and the available IT infrastructure. Much of the basic IT infrastructure was also ready, so that education could continue almost without delay. Indispensable here is the much-praised video infrastructure that has become central to the streaming of the many lectures and knowledge clips. Despite the lack of social contacts, most students and employees see enough positive aspects of online education to give it a permanent place in education. Especially the extra flexibility and increased efficiency are often mentioned (Turner 2021). The further development of the online education offer meets these changing expectations of students and lecturers. In addition, it fulfills EUR's strategic ambition to achieve a positive social impact by giving target groups access to education that would otherwise not be able to follow education on campus. Two new initiatives, ErasmusU_Online and the eMaster RSM-ESE, mainly target this group of students. From a strategic perspective, it is vital to support these developments as much work still needs to be done to digitally support all aspects of online-only learning, including skills training, student engagement and social connection. In this way, we are also developing an EUR-wide response to the rapidly developing commercial providers that are expanding their offerings in the education market.

Challenging view: ***Unethical to return to physical education***

Because of Corona, the courses of Harvard Professor Eric Mazur also had to be taught online. During this period, he has become convinced that he can provide so much better education online than he could ever achieve physically. So much so that he finds it even unethical to return to physical education. His own research shows that the distance between students and lecturers in the lecture hall is correlated to their results on the exam. Students sitting in the back of the room always get a lower grade. In online education, every student sits in the first row and with the use of smart technology and modern didactics lecturers can give everyone the attention he/she needs.

Donald Clark (2021) Keynote Annual Meeting LDE Center for Education and Learning

Inspirational example: ***Stanford LEAD Online Business Program***

Stanford's LEAD program is a one-year executive MBA program that focuses on managers who want to guide organisations in their transformation process. The strength of the program is that it connects globally dispersed professionals, each with their own background, perspective and working method. The program is completely online and enables participants to directly apply acquired insights within their own context. The program is supported with tools that not only focus on knowledge transfer from lecturers but also on co-construction of new knowledge with peers, interaction during and outside meetings, and building and maintaining a community. Participation fee is $19.200.

Selection of finished projects
- CLI, EDIS and all schools: digitising learning materials and learning activities (web lectures, knowledge clips, workshops, etc.) for COVID education.

Selection of current or planned projects
- CLI and all schools: Setting up an online-only offer for premaster and master students through ErasmusU_Online.
- RSM and ESE: Setting up an online-only offer for master students through the eMaster RSM-ESE.

Action: Initiate visioning on online-only education with (vice) deans RSM/ESE and CLI.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Ensuring our education is future-oriented.*

Strategic dialogue: This topic is part of the strategic theme *Teaching & Learning delivery.*

2.1.10. Hybrid teaching

The aforementioned flexibility and increased efficiency during the COVID lockdowns has a clear effect on the expectations of lecturers and students in the post-COVID era. Many educational institutions are working to combine the best of both worlds (physical and digital) in the design of their teaching spaces (SURF 2021). This can include streaming the image of the lecturer, the entire teaching space and/or the online students. Support is also being developed to make it much easier to share content between lecturers and students and to make physical-digital collaboration run smoothly. The advantage of hybrid education is that students can contribute more actively to education without the physical distance being a limitation.For example, for students who want to follow part of their studies from abroad, who have difficulty finding an (affordable) study place in Rotterdam, who have a physical disability, or who are otherwise unable to come to campus. For the time being, hybrid education also has challenges to which answers must be sought. Dividing attention costs the lecturer extra energy and causes extra cognitive load, which cannot be spent on guiding the learning process. In addition, online students may feel less involved, because lecturers more easily pay attention to physically present students. On the other hand, more focus on online students can give the students who are physically present the impression they came to Rotterdam 'for nothing'. Within the schools, supported by the CLI and EDIS, this academic year, experience will be gained with lecturers in lecture halls where extra facilities have been realised. Based on these experiences, a well-considered choice can be made at the end of the year about investments in extra facilities in the lecture halls.

Challenging view: ***Microsoft's Mesh***

When we think of hybrid education, we often think of adding online students to a group of students who are physically together. It is then a challenge for lecturers to give everyone the same amount of attention, because their attention is naturally focused on those who are physically present. Why not reason the other way around? Why not add the physical students to the group of online students so that everyone is digitally together? Microsoft is going to make animated avatars available in Teams next year. Users can create an avatar of themselves, mimicking their facial expressions based on their voice. In this way, all students get a valuable meeting, no matter where they physically are.

Marc Remmers (2021) Information manager ErasmusMC

Selection of current or planned projects
- CLI and EDIS: Pilot with a number of hybrid teaching rooms to gain experience in using them in education.

Action: Initiating joint vision development and designing hybrid educational spaces with (vice) deans of education, RE&F, CLI and EDIS.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Ensuring our education is future-oriented.*

Strategic dialogue: This topic is part of the strategic theme *Teaching & Learning delivery.*

2.1.11. Personalised learning

One of the central educational objectives, in the strategic plan 2024, is to offer students more room for personal development.This includes a toolkit that supports students in drawing up their own personal learning path. In the past year, Erasmus University College (EUC) has gained experience with such a toolkit in Osiris called the "PlanApp". This PlanApp offers students the opportunity to put together their entire study program and determine for themselves in which year, in which period and at what time they want to follow their courses. It is also possible to have these study plans approved by study career counselors, but the EUC has not yet opted for this. The first experiences are positive and give reason to gain experience with this toolkit more broadly within EUR. Experiences within other studies mainly serve to test whether the PlanApp can properly support the differences in freedom of choice, entry requirements and timetables of the various courses.

Inspirational example: ***25% electives in Avans education in 2025***

Some of the students like to be able to choose and bundle courses so that they receive a diploma with subjects they want to specialise in. This means that courses in different study programmes must be modularly designed to be interchangeable. An extra bonus of this approach is that it stimulates multidisciplinary work between lecturers within their own study programme and from other study programmes.

View explanation from a student, programme coordinator and product owner perspective
https://edu.nl/gekg3

Carla Asselsbergs (2021)
ProductOwner AvansStudyPath

In addition to offering more freedom of choice, the national acceleration plan is considering four additional options for personalising education by enabling students to accelerate, slow down, deepen or broaden education:

1. *Study at their own pace:* students are given more opportunities to speed up or slow down their education. This offers them the opportunity to take more courses in the same time, or to take more time for their personal development.
2. *Studying off the beaten track:* students are given more opportunities to take courses at other institutions (HBO and WO).
3. *MyDiploma:* students are given more opportunities to compose a short-cycle program that leads to a recognised diploma based on their personal needs.
4. *Modular study:* students are given the option to register for one or more courses without registering for a full program.

Inspirational example: ***Adaptive Bachelor of Biology @ Arizona State University***

In 2019, ASU started a large-scale revision of their bachelor's degree in Biology. Instead of a model in which all students take the same courses, students are offered fully personalised education. Static textbooks and stand-alone courses have been replaced by learning activities that students progress through in their own speed and order. The learning activities are bundled in thematic courses and interconnected in learning lines at curriculum level. The digital platform offers the learning activities, each of which is concluded through a formative self-assessment. Based on that result, and the confidence students have in mastery of the subject, the platform offers the following learning activity. This can be a learning activity that builds on the knowledge learned, or a learning activity that supports mastery of the current subject because the student has not yet understood the subject well enough. The individual learning activities are combined with weekly activities in which all students participate and learn together.

Wilco te Winkel (2021)
Informationmanager Education EDIS

Selection of finished projects
- CLI, E&S, EUC: Implementation of PlanApp within EUC.

Selection of current or planned projects
- EDIS: The EUR is participating in the national acceleration plan "Making education more flexible".

Action: Discussing the use of the "PlanApp" application for several study programs with (vice) deans of education and E&S.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Personal learning, personal leadership.*

Strategic dialogue: This topic is part of the strategic theme *Student enrolment.*

2.1.12. Lifelong Learning

Due to the rapidly changing needs of the labor market, educational institutions is expected to develop an offer to keep the knowledge and skills of their alumni up to date. This group of professionals in particular has a great need for more opportunities to study at their own pace and independently of time and place, because they have to combine study with work, family, care responsibilities and social life. The digitalisation of education offers them the necessary flexibility and freedom of choice. The parliament and the ministry want to further stimulate this development by adjusting the legislation and financing of the current education system. On the basis of current legislation, a study programme forms a coherent whole of "units of study" and has an educational program that is virtually the same for all students. The bill that is being drafted anchors the possibility to establish "units of learning outcomes" that relate to a practice-relevant (professional) situation. This gives students more room to capitalise on work and life experience, for example in the form of exemptions. The aim of this bill is to promote participation and certification by means of more flexible, attractive and accessible higher education. After this change, educational institutions will not only receive funding upon intake and certification, but also after students have completed parts of a study program. In recent years, the ministry has strongly supported this development in the national acceleration plan "Educational innovation with ICT". Many higher education institutions are actively developing a suitable offer and implementing the necessary changes in the support organisation to be able to offer alumni a lifelong educational offer. The EUR has also been working hard for years to develop post-initial offerings for alumni and professionals. In many cases, however, the support organisation (people, processes and systems) is setup independent of the organisation around the initial offer. By learning from each other's processes and systems, and then harmonising these, the growing need for lifelong learning can be efficiently met on a larger scale.

Challenging view: ***Bachelor programmes in 2040***

In 25 years' time, only the segment of the best research universities will continue to be interesting in obtaining a full bachelor's degree in the context of on-campus learning [...] After a campus period of one or two years, most students will enter the labor market to possibly continue studying for a bachelor's degree later via distant learning.

Bert van der Zwaan (2017)
Will the university make it to 2040?

Inspirational example: ***MicroMasters at Wageningen UR***

MicroMasters are a series of four connected online courses (MOOCS). Upon successful completion of a MicroMaster, a student receives a certificate and academic credits (ECTS). They can later use these credits to shorten an on-campus program. The aim of these MicroMasters is to support people to study part-time throughout their life course and to keep the door open to do a full Master's later on.

Drift (2021). Learning digitalisation

Inspirational example: ***Universities of the Netherlands present platform for Lifelong Development***

The growing demand for Lifelong Development (LLO) is a logical consequence of the rapid changes in professions and careers that are more flexible. Training no longer stops at the basic qualification. There is a growing need from society for new knowledge and skills for solving major social issues. The fourteen universities currently offer 1423 modules on the online platform universitairdoorleren.nl, in an enormous variety in terms of content, length and structure. You can find workshops from one day to complete master programs. The offer is constantly changing. In line with developments in the labor market, new modules are constantly being developed in consultation with companies and social organisations.

Wilco te Winkel (2021).
Informationmanager Education EDIS

Selection of current or planned projects

- E&S: Migration of all data on the educational programs of the EUR to the National Register of Educational Institutions (RIO). Supported by the STAP budget (Stimulans ArbeidsmarktPositie), all citizens can continue to receive education during their career. All educational activities that citizens can follow are listed in the RIO register.
- EDIS: The EUR is participating in the national acceleration plan "Making education more flexible".
- Information managers education: Inventory of functional requirements for possible European tender of an information system to support the management of a curriculum.

Action: Initiate joint visioning on harmonisation of educational logistics processes initial and post-initial education with (vice-)deans of education, Academic Affairs, E&S, and EA.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *The importance of lifelong learning.*

Strategic dialogue: This topic is part of the strategic themes *Academic Administration* and *Student Administration.*

2.2 Empower staff and students through the provision of digital skills training

In the rapidly digitising world, further training of knowledge and skills is a permanent necessity. The success of any institution is determined by the ability of its employees to adapt to changing times. Just before COVID, for example, came Microsoft Teams. This platform subsequently became the standard for meetings and collaboration during the lockdowns. In addition to extra opportunities, the number of digital threats is also increasing, such as phishing emails, hacks, identity fraud, or data leaks on one of the many digital online platforms. To be able to successfully capitalise on the extra opportunities and mitigate the risks, it is very important to pay a lot of attention to the soft side of digitalisation, i.e. the development of employees.

2.2.1. Staff and students

In addition to knowledge about new digital applications and processes, it is also important to stimulate the development of 21st century skills. These are generic skills that are necessary to function well in the knowledge society (Christoffels, 2016; Hoornstra, 2019). Characteristic of these skills is that it is not only about learning content and behavior, but also about learning new content and behavior *quickly* so that employees can remain successful in the face of ever-faster changes. It is a collection of twelve general skills that can be divided into four clusters: thinking skills (critical thinking, problem solving, creativity), interpersonal skills (communication, collaboration, social and cultural skills), intrapersonal skills (metacognition, self-regulation and entrepreneurial skills), and digital skills (instrumental skills, information skills, media literacy). By developing digital skills in conjunction with the other skills, the Erasmian values (critical, connecting, inclusive, flexible and entrepreneurial) can also be taken into account. The development of digital skills can thus become part of the *Erasmian 21st century skills* program. The *Erasmian 21st century skills* is the collection of 21st century skills supplemented with specific skills related to research, data management, privacy and security.

Inspirational example: ***EduBadges for 21st century skills mboRijnland***

mboRijnland awarded its first edubadges to four students. This is the start of the organisation-wide work with edubadges to encourage students to further develop their skills, among other things. mboRijnland considers it important that students actively work on their own development and wants to stimulate this through the edubadges programme. Apart from a diploma or certificate, students can show that they have certain skills, even if these are not directly related to their own study programme.

Selection of finished projects

- CLI and Risbo: Developing Microlabs with short how-to modules on specific didactic issues.
- CLI and Risbo: teachEUR is a website offering an overview of teaching methods to make education more interactive.

Actions:

- Discuss possibilities to include *Erasmian 21st century* skills in TOP program with directors of schools and services, HR, and the EB.
- Discuss possibilities to include *Erasmian 21st century skills* in student course offerings with (vice-)deans of education.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal Becoming an Erasmian.

Strategic dialogue: This topic is part of the strategic themes *Training & Development* and *Professional Learning.*

2.2.2. Executives

The innovative strength and entrepreneurial spirit within EUR are strong drivers for achieving the ambitious EUR strategy 2024. At the same time, the question arises how the planned changes can be anchored in a robust way of working within the university? To give direction to the strategy, the Executive Board and deans opt for *transformational leadership* in which managers lead by example and intrinsically motivate their teams with their long-term vision. The digital transformation in which the university finds itself requires the same leadership style (Mobilee, 2021). Transformational leaders embrace digital transformation and foster an entrepreneurial culture of experimentation. Fears or resistance are reduced by involving employees in the process in an appropriate way and by giving them confidence so that there is room in which mistakes can be made. To be able to play this role well, it is important that managers at all levels are well aware of the current and future opportunities that digitalisation can offer. In line with the EUR Strategy 2024, digitalisation topics that are focused on are (1) customer-oriented, (2) process-oriented and (3) data-driven working in (4) multidisciplinary teams.

Selection of current or planned projects
- EDIS, HR, Erasmus Academy: Developing course "Information Management in Higher Education".

Action: Discuss opportunities to develop digital leadership with directors of schools and services, HR, and the EB.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Leadership*.

Strategic dialogue: This topic is part of the strategic theme *Talent Management*.

2.2.3. Organisation

In order to be able to respond successfully to the digitalisation developments, the change capacity and agility of the organisation needs to increase. This has already been recognised in last "Masterplan Digitalisation EUR". Growth in organisational maturity is a long-term goal that requires the necessary attention in the coming period. In addition to the development of employees and managers described, growth in the following organisational capabilities is key:

1. *Customer-oriented change:* The organisation is faced with the big step to grow from an activity-oriented to a process-oriented organisation and from there to more customer-orientation.
2. *Process-oriented change:* In order to achieve the strategic objectives and to make customer-oriented working the norm, EUR must invest in the further development of process-oriented working. By making joint agreements about the way in which processes take place, available knowledge within the schools and services can be shared more easily.
3. *Data-driven working:* Processes and services are currently working on the basis of missing, incomplete or incorrect data. By realising immediately applicable improvements in the quality and accessibility of already available data and the data infrastructure, EUR is developing the ability to efficiently organise data-driven processes and services for education, research and business operations and to develop new services.
4. *Working in multidisciplinary teams:* Whishes and needs change quickly and technological improvements follow each other ever-faster. Solutions increasingly require different perspectives and cooperation in the chain. By setting up multidisciplinary teams that work together for a longer period of time, productivity increases.
5. *Valuable change:* Investing in digitalisation projects also means selecting those proposals that are most valuable. Working with business cases should be further developed to make it leading during the preparation and implementation of the entire project.
6. *Ownership:* Ownership is of decisive importance in order to be able to daringly innovate. Clarity must be given to the role and mandate of an owner with associated control over resources, so that greater control can be given on the content, quality and costs of the requested services.
7. *Safe change:* Trust and security are increasingly becoming EUR's core values. From an information security perspective, this means that the desired availability, integrity and confidentiality of information systems are guaranteed at the right level. From a privacy perspective, the highest priority will be given in the coming period to reducing the high-risk areas in the processing of personal data.
8. *Targeted change:* Effective management is essential to successfully implement the digital transition, whereby attention is paid to both the hard and soft aspects of governance. Essential points are directing the changes from a shared vision of the future and strengthening and broadening responsibility and control capacity at the levels where the work is performed.
9. *Future-oriented change:* Architecture is a precondition to steer all desired changes in the right direction and to ensure that today's choices do not limit tomorrow's choices. In order to further develop working under architecture within EUR, it must become an integral part of decision-making around all digitalisation projects.
10. *Change smart:* More and more SaaS solutions and industry-wide facilities will be offered and deployed. A modern sourcing strategy can provide for organising extra capacity and quality, and the realisation of savings that can be used for the managing of new services.

Growth in maturity in the first five development aspects has been delegated to the programme Stepping Up Professional Services. Growth in maturity of the last five development aspects is the responsibility of the CIO / Director of IT.

Selection of current or planned projects
- E&S and EDIS: Inventory of school differences in processes and information provision regarding elective courses.
- EDIS, ESSB, ESL, ErasmusMC: Use of process mining analysis to gain insight into the registration process (ESSB) and student journey throughout the curriculum (ESL).

Action:
- Discuss development opportunities related to customer-oriented, process-oriented and data-driven working in multidisciplinary teams with responsible directors E&S, HR, CPC.
- Draw up plans for development of ownership, safe, smart and future-oriented change under the responsibility of the Chief Information Officer.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Alignment with digital society.*

Strategic dialogue: This topic is part of strategic dialogue on *Business Capability Management.*

2.3 Develop outreach and educational resources

2.3.1. Erasmus Research platforms

The Erasmus Initiatives bundle Erasmus University's research on issues related to (1) sustainable prosperity, (2) better healthcare, (3) quality of life in major cities and (4) artificial intelligence. These are the four themes with which EUR gives substance to its specific, distinctive signature in order to increase the social and economic impact of its multi- and interdisciplinary research. The success of the Erasmus Initiatives partly depends on the extent to which it is possible to interest and connect parties outside the university to these themes. In order to facilitate this on a global scale, each theme could be given its own platform where (inter)national cooperation partners can work on developing and exchanging scientific insights on these major social issues. For example, data can be exchanged between participants and analyses can be performed. It is also possible to collaborate on drawing up investment proposals or exchanging current questions and needs. The Erasmus Research platforms can be developed in line with ideas for the sector-wide research platforms (described in the next chapter) to maximise the use of the national research infrastructure.

Inspirational example: ***ODISSEI***

There is already some experience within EUR in managing these kinds of international research platforms. One of the larger research platforms is administratively housed at the Erasmus School for Social and Behavioral Sciences. Professor Pearl Dykstra is chair of the national Open Data Infrastructure for Social and Economic Innovations (ODISSEI) consortium. The consortium consists of 34 participants, including various schools of social sciences, economics and business, KNAW and NWO, public research institutes and Statistics Netherlands (CBS). Via ODISSEI, researchers can enrich their own data with other data collections, including all kinds of CBS registrations. In addition, researchers can perform analyses on their data on the national supercomputer Snellius (SURF, 2021). They can also receive support in modeling their calculation methods. Recently, ODISSEI received funding from the NWO in the context of the Dutch roadmap for Large-Scale Scientific Infrastructures.

Action: Initiating visioning research platforms to support Erasmus Initiatives with (vice-)deans for research, Academic Affairs, ERS, ECDA, UL and EDIS.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Accommodating impact* and *Accelerating impact*.

Strategic dialogue: This topic is part of the strategic themes *Digital Ecosystem Management* and *Research Administration*.

2.3.2. Knowledge infrastructure Rotterdam

Erasmus University does not want to be an isolated institute, but rather a knowledge center at the heart of society. To achieve this, EUR can build on a decade-long collaboration with the Municipality of Rotterdam and the knowledge infrastructure that has been developed during this time. Knowledge from science and practice come together in a multitude of different partnerships, and work is done to further develop insights and to share the results.

Inspirational example: ***BIG'R is better***

As a city, how can you ensure that municipal policy actually works in practice? What role can science play in this? The BIG'R (Behavioural Insights Group Rotterdam) project started in 2017 as a collaboration between the Municipality of Rotterdam and the Erasmus University and stems from the perceived need to use behavioral knowledge and scientifically substantiated municipal policy. BIG'R wants to use proven insights from behavioral science to positively stimulate the behavior of Rotterdammers for a healthier and more vibrant Rotterdam. In a city with a very diverse population, BIG'R offers opportunities to observe policy decisions for yourself. By working closely together, scientists and policymakers can implement and evaluate interventions from government policy. With this method, BIG'R closes the gap between science and practice on both sides.

Inge Merkelbach (2022)
PostDoc and Managing Director BIG'R

As with setting up impact-driven education, initiators quickly run into the fact that many EUR information systems are not accessible from outsiders. For example, it would help if external partners had access to more scientific literature. EUR could also develop courses that help partners develop research skills such as acquiring, processing and analysing data. In addition, sharing data with social partners lead to many questions and uncertainties in practice. Here too, an assessment needs to be made of what is needed to make the connection with the city easier.

Action: Investigate barriers to access to EUR information systems by outsiders.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Advancing impact*.

Strategic dialogue: This topic is part of the strategic theme *Identity & Access management*.

2.3.3. Culture campus

Together with Rotterdam University of Applied Sciences, Codarts and the Municipality of Rotterdam EUR is working on the realisation of the culture campus in South Rotterdam. The educational institutions involved would like to contribute to more higher education and culture in South Rotterdam. They also want to conduct research into the social issues that play a role in this region. The culture campus must be an inclusive, inviting place where local residents, visitors, students, lecturers, culture makers, creative entrepreneurs, companies and researchers can meet. It will be a place to learn and study, do business and research, meet and confer, create, innovate, exhibit and present. Plans are still in full development, but it is clear that this initiative will also bring new expectations with regard to digital services and will impose requirements on access to EUR's information systems

Action: Investigate expectations of digital services on Culture campus with AZ and program management.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Engaged and challenged by societal changes* and *Accelerating impact*.

Strategic dialogue: This topic is part of the strategic theme *Identity & Access management*.

2.3.4. Impact at the Core

Within the strategic program "Impact at the core", the implementation of a collaboration platform is being prepared to give social and commercial institutions a place at the heart of our education. In impact-driven education, students work together with each other and stakeholders on concrete societal challenges. The acquired knowledge and skills enable them to make a meaningful contribution to solving socially relevant challenges and help them in their orientation towards the future labor market. Opening up EUR's information systems to alumni and non-EUR employees is a lot of work. Issues surrounding privacy, security and archiving of student data quickly arise. Nevertheless, this is one of the central strategic objectives for which it is necessary to further investigate which preconditions must be fulfilled in order to make education at EUR more impact-driven.

Action: Designing application(s) and/ or support organisation around impact-driven education with (vice-)deans and programme management.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Engaged and challenged by societal changes* and *Advancing impact*.

Strategic dialogue: This topic is part of the strategic theme *Curriculum Design*.

2.3.5. Convergence / Interuniversity education

As with research, more and more attention is being paid in education to the major societal challenges in which many aspects are interrelated. Collaboration with other schools and knowledge institutions is essential in education for creating a meaningful and positive societal impact. Nationally, universities are therefore increasingly entering into strategic partnerships in which a balance is sought between the humanities, sciences and social sciences. Examples are the EWUU alliance (TU/e, WUR, UU and UMC Utrecht) and the LDE alliance (Leiden, TUDelft and EUR). Recently, the strategic partnership TUDelft, ErasmusMC and EUR has been added. EUR is also the driving force behind UNIC, a European alliance of eight universities that jointly form a new European University that focuses on social challenges specifically within post-industrial cities. Within all these alliances, parts of the educational offer are opened up to each other's students and courses are increasingly being developed jointly.

Inspirational example: ***Challenging future generations***

Within the EWUU alliance we didn't do much more than exchange courses in the first few years. As a result, for the first time, TU/e students could also take psychology courses offered by the UU. This year we take the next step in which new courses are jointly developed and offered to all students within the alliance.

Ageeth Lindner (2021)
Information manager
Wageningen University

Inspirational example: ***EduExchange-portaal***

Taking courses at other institutions has been possible for a long time, but this creates a lot of extra work for both students and educational institutions. In order to remove the barriers experienced by students and administrations, SURF has developed a nationwide infrastructure and portal through which students can orientate and register themselves for courses offered by selected institutions, for example institutions within the LDE consortium. After completing a course, the results will automatically be exchanged with students' home institution. The sponsor of this project is Ulrike Wild: "In the future, it is untenable that all education at one institution takes place in one program. It must become normal to make better use of each other's education and to increase the possibilities for your students. We are laying the first paths to make the educational landscape more accessible. Not with a big bang, but with small steps."

Ulrike Wild (2021)
Project leader and chair of the
Dutch Acceleration Zone Flexibility

To make this possible, a lot will have to be changed in the educational support organisation (people, processes and systems). Many of the current processes are optimised at the level of the programme, school or service. In order to exchange reliable and high-quality data with strategic partners, far-reaching coordination and harmonisation of the administrative processes within the schools is required. For example, with regard to the way in which students register for courses, work groups or exams. An analysis of work processes surrounding the registration and taking of elective courses, for example, shows that the systems that schools use, the processes that students need to follow and the information that is provided differ greatly from one school to the other. Processes that are not strategically distinctive will have to be redesigned as uniformly as possible to enable efficient and scalable exchange of data with strategic partners.

Inspirational example: ***Erasmus without papers***

"Erasmus without papers" is an initiative to digitally exchange data between European educational institutions in order to stimulate student mobility at a European level. During the current exchange program (2021-2027), the program will be fully digitised. This means that functionalities become available to exchange data between partner institutions regarding inter-institutional agreements, student nominations, learning agreements with students and transcripts of their results. The progress reporting to the European Commission is also automated for financial support of the students. EUR has joined forces with nine other institutions to ensure that the joint Student Information System (Osiris) can exchange the necessary data.

Ruud Rooimans (2021)
Architect Informationsystems EDIS

Selection of current or planned projects

- E&S, EDIS, SURF: pilot studentmobility to allow students to register easily for a selection of minor courses on offer by the universities of Leiden, Delft and Erasmus. Including information about the courses and the automated exchange of the results.
- Academic Affairs, E&S, EDIS: Setting up UNIC Virtual Campus to allow students of eight European Universities to register easily for a selection of courses on offer on the different universities. Including information about the courses, reference to the specific digital learning environment, and the automated exchange of the results.
- E&S: Implementation Erasmus Without Papers a project that facilitates exchange of digital information between European institutions in order to stimulate student mobility.

Action: Initiate joint vision formation harmonisation of educational logistical processes for interuniversity collaboration with vice-deans of education and E&S.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Engaged and challenged by societal changes*.

Strategic dialogue: This topic is part of the strategic themes *Student Administration* and *Academic Administration*.

2.3.6. Open Pedagogy

One of EUR's strategic goals is to increase student engagement in education. This can be achieved by creating an inviting and activating learning context in which complex problems from practice are presented as described in the previous section. The engagement of students can be further increased by inviting them to publicly share their contributions(SURF, 2019). This makes the results of their work openly accessible, so that others can build on them and add value again. New perspectives can come from other cultures, but also from different educational levels, the professional field or society. Students indicate that by sharing their insights openly, they feel more responsible for their products. They also feel more part of the professional community and experience more "partnership" in their relationship with their lecturers.

Action: Initiate joint vision development (vice-)deans education, CLI, UL and E&S.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Engaged and challenged by societal changes*.

Strategic dialogue: This topic is part of the strategic theme *Teaching & Learning delivery*.

2.3.7. Open Education

In addition to making student products available, much attention is paid nationally to making teaching materials available online. Open learning materials contribute to achieving a positive societal impact by removing financial barriers and increasing the accessibility of education (Acceleration Plan, 2020). The increasing costs of learning materials and the increasing power of commercial providers are also an important reason for the Ministry of Education, Culture and Science to encourage institutions to make their learning materials more widely available. According to the rectors of the universities control over access to knowledge (and the user data that is collected in the process) must remain with educational institutions to guarantee independent knowledge sharing (Volksrant, 2019). The availability of more learning material also offers more possibilities to tailor it to the individual learning needs and outcomes of students. Lecturers would like to offer more learning material such as interactive games, e-books, or quizzes, but at the same time also indicate that there is very little relevant material available and that they have too little time to develop it themselves. As with Open Science, Open Education also means a cultural shift for all those involved. The role of publishers, the appreciation of lecturers, the support from the institution and the available infrastructure are all factors that are important to get this movement started.

Inspirational example: ***ShareStats-Share stats openly with a subject community***

Research methods and statistics play an important role in the social and behavioral sciences. In order to master these subjects properly, students need high-quality practice material. Until now, statistical practice and test assignments have mainly been developed individually or within one's own department, which means that efficiency and quality are not always optimal. In Sharestats, EUR works together with UvA, VU and UU on the reuse, sharing and further development of statistical learning material, which is bundled in an openly accessible database. More practice material will increase motivation and study success among students. The quality of the assignments is guaranteed by means of an active subject community of lecturers and efforts are made to ensure a meaningful cataloging of the learning material.

Marleen de Moor (2021)
Project leader ShareStats

Selection of current or planned projects

- CLI and EDIS: The EUR is participating in the national acceleration plan "Towards digital (open) educational resources".
- ESSB: ShareStats project member in a collaboration project with the UvA, VU and UU for developing and sharing high-quality practice material in the field of statistics.

Action: Initiate joint vision development (vice-)deans education, CLI and the UL.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Ensuring our education is future-oriented.*

Strategic dialogue: This topic is part of the strategic dialogue on *Teaching & Learning delivery.*

Overview topics for strategic dialogue

This chapter describes a number of actions that fit within a number of larger themes. These themes could be put on the agenda for further exchange of views during the regular meetings of the (vice-) deans of education.

Teaching & Learning delivery: All activities aimed at delivering a learning experience to students of the organisation and enabling them to engage with learning in the subjects as described in the curriculum. This includes the support for learning resources in a wide range of formats to support learning and teaching. As well as the support for lecturers to provide teaching activities face to face or online, and student to participate physically or digitally.

Student Assessment: All activities aimed at assessing whether a student has achieved the learning outcomes of the curriculum. Including the way in which feedback is given and assessment is used to stimulate student development.

Professional learning: The organisation's effort to increase staff expertise for the benefit of the student's learning experience.

Student Completion & Graduation: All activities aimed at conferring degrees (and other awards) to students who have qualified appropriately and hence become graduates. Including recognition of extracurricular activities, volunteerism, and awards and funds they have acquired.

Student enrolment: All activities aimed at ensuring that students are fully enrolled at the programme and inducted into the organisation community. Including any pre-registration for modules/courses that will be given in the future. Also all the information necessary for students to be able to choose well.

Academic Administration: All activities related to frameworks, guidelines, scheduling and planning.

Student Administration: Managing all activities aimed at keeping track of students' data and their academic progress.

Curriculum Design: The support that lecturers receive to ensure collaboration between lecturers in devising, developing and releasing components in the curriculum that give substance to the desired learning outcomes.

Digital Ecosystem Management: Managing the way in which EUR is digitally connected to and influencing its environment.

Identity & Access management: Managing user data in applications and IT systems. Including information about the level of access, security attributes and user attributes.

These themes could be put on the agenda for further exchange of views during the regular meetings of the (vice-) deans of research.

Digital Ecosystem Management: explanation see above.

Research Administration: Managing the research infrastructure and complying with applicable laws and regulations.

These themes could be put on the agenda for further exchange of views during the regular meetings of the executive directors of schools and services.

Training & Development: Developing knowledge and skills of employees so that they are appropriate to the desired functioning of the organisation.

Talent Management: Assessing, guiding and developing high-potentials with special value for the organisation.

Business Capability Management: all activities related to providing insight into, prioritising and managing the organisational qualities that are preconditions for realising the strategy and vision.

Four spearheads for the digitalisation of the EUR

3 Enable knowledge exchange in a digital environment.

3.1 Sector-wide Research and Education Platforms

The need and necessity to collaborate outside the institution with colleagues from other knowledge institutions, social organisations and the business community is felt sector-wide. That is why national thought is being given to setting up different platforms to enable secure data exchange and to facilitate collaboration between many different institutions.

Three platforms are being considered to support the different phases of conducting research:

1. *Smart Region* platform aims to define the research. It provides support to all parties involved in providing input on the need for new knowledge in a few years' time. These parties can, for example, be knowledge institutions, hospitals, social institutions, the government or the business community that indicate which knowledge they deem necessary regionally in the long term.
2. *Smart Campus Data* platform focuses on preparing the research and disseminating the insights. It offers researchers support for writing their research proposals and searching for available research data from similar research. After completing their research, they can use this platform to share their own findings and datasets.
3. *Open Research Data* platform is focused on conducting the research.

Four platforms are being considered for the different phases of providing education:

1. *Smart Region* platform is focused on defining education. This platform has the same functionalities as described in the research, it may even be the same platform.
2. *Education Exchange* platform is focused on sharing education. It is a kind of marketplace where lecturers can come into contact with each other to exchange educational materials such as lectures, assignments or even entire courses. These teaching materials can be shared for free as part of "Open Education", or made available through a micro payment system through which lecturers can receive financial compensation for their efforts.
3. *Life Long Learning* platform is aimed at offering education, including the (financial) processing of application and registrations. In this platform, institutions can offer a selection of their courses for specific target groups, such as professionals in the public sector. It can also offer a (different) selection of courses to those interested in a specific theme, such as migration or poverty. Or yet another selection of courses for students within consortia.
4. *User Study Experience* platform is focused on conducting education. This is the personal portal in which learners have an overview of all courses they follow at all institutions. Through this platform, learners have low-threshold access to the various systems within the various institutions.

These platforms currently only exist on the architects' drawing boards. The ideas offer generic solutions to challenges that individual institutions are now trying to solve on their own. Coordination with the primary process and further elaboration of these ideas can ensure that cross-institutional collaboration and information exchange can be realised more efficiently and effectively.

Selection of finished projects
- SURF, HOSA, EDIS: Drawing up an architectural vision for information exchange in higher education sector.

Action: Initiating vision formation sector architecture for collaboration and exchange of research and education with vice deans for research and education, ERS and the UL.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goals *Accommodating impact* and *Accelerating impact*.

Strategic dialogue: This topic is part of the strategic theme *Digital Ecosystem Management*.

Overview topics for strategic dialogue

This chapter describes a number of actions that fit within a number of larger themes. These themes could be put on the agenda for further exchange of views during the regular meetings of the (vice-) deans of research.

Digital Ecosystem Management: Managing the way in which EUR is digitally connected to and influencing its environment.

Research Infrastructure Management: Managing the research infrastructure.

Four spearheads for the digitalisation of the EUR

4 Towards customer-oriented and efficient Operational Services.

Digitalisation and the use of appropriate technology are of great importance to EUR's research and education. Appropriate operational services are essential to support these primary activities of the institution. EUR's objectives also state that we focus on good interaction between services and processes, connection to the digital society and customer-oriented working. The agility, efficiency and effectiveness can be greatly increased by far-reaching harmonisation and digitalisation of services, work processes and systems used. Harmonisation is also needed for greater privacy and cyber-risk resilience and smooth digital collaboration with partners in the private and public sector. For a more effective supporting role for the operational services, strategic coordination is required. Design and realisation will become more short cycle to remain closely aligned with the dynamics and uncertainty in the world in which the EUR operates. By moving towards more data and process-driven work, the university can support and strengthen both internal and external activities and initiatives by lecturers, researchers, students, and alumni.

4.1 Customer experience

A look outside

Partly due to the lockdown, online services have grown enormously. Many organisations were forced to quickly offer their services digitally, and ease of use turned out to be decisive for success. We can benefit from the lessons learned in other sectors and put the customer experience first. By responding better to the needs that exist, by organising the service supply chain in a different way and by ensuring greater consistency in the way we work. This is also one of the strategic goals of Professional Services: "The customer is at the centre of everything we do and are, with services that add value."

> *Inspirational examples:* ***Online services during COVID-19***
>
> **Within a few weeks, restaurants started to serve their customers in a completely new way by providing them with a 'fully catered evening at home'. Pupils and students found online lecturers to complement their own lecturers, professors and learning resources. Within very different industries, it has been ensured that products are delivered that match the needs of the customer with minimal administrative procedures and maximum insight.**

4.1.1. Strengthening demand

The redesign of digital services requires the 'demand-driven system' to be better organised. The priorities are determined based on the needs of the faculties and services. The realisation requires digital security and privacy by design and this takes place within the framework of legislation and risk management. All with the help of experts in areas such as privacy, security, purchasing, legislation, architecture, and archiving. It is advisable to weigh the use of financial resources against the value generated by the realisation. The demand is huge, the possibilities are endless, but we have a limited capacity to change. Not everything can be developed, put into use, and managed at the same time.

- Creating and managing the project portfolio including a Project Portfolio Board for all projects with a digitisation component.
- Example of a planned project: From customer perspective to optimised end-to-end processes; pool of business analysts towards societal impact and digitalisation.
- Action: Take the next step in organising the demand-driven system in which the priorities are based on the needs of faculties and services. Discussion could take place with the directors of faculties and services.
- EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Customer-driven*.
- Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Interaction with the primary process*.

Strategic dialogue: This topic is part of the strategic theme *Business Capability Management*.

4.1.2. Towards transparent working practices

Insight into business operations is not only important for business operations. All kinds of stakeholders are asking for more insight and transparency: employees, students, the Ministry of Education, Culture and Science and other interested parties ask and expect this. This need has been enshrined in several laws over the years. For example, the institution has been publicly accountable for years via its annual report and the demand for insight becomes more divers. The need for transparency about (public) information is also reflected in the Open Government Act (WOO) and the new Public Records Act (Archiefwet). Increasingly, it requires adjustment to the design of information systems and information management to meet these requirements. We also need to make and keep the information permanently accessible. Transparency does not only apply to insight into the information (flows), it will also enable management by offering insight into compliance topics (security, privacy) and architecture: where do we stand and what are the gaps and balanced risks?

Project idea from HR Legal and possibly other departments in which case histories are handled and in which a file tracking system is desired. The registration of terms and tasks is important.

Action: Develop and adapt information management to meet the increasing transparency requirements (for example, WOO). It starts with developing frameworks in dialogue with CPC, JZ and CIO Office (including DIM).

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal Alignment with digital society.

Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Making full use of the digital era*.

Strategic dialogue: This subject is part of the strategic themes *Corporate Government* and *Legal Services*.

4.1.3 Hybrid working

Digital working from home became necessary in 2020 and we were able to rely on the available ICT infrastructure and several essential information and IT facilities, including an accelerated implemented Office 365 environment. Finding a new balance between work and private life, especially if there are also increased care at home, became a challenge for many. At the same time, working from home turned out to be extremely efficient and productive and many employees indicate that working from home remains desirable for at least part of the working week. This also facilitates regional and international cooperation. A few months of hybrid working has shown that we can also work well together from a mixture of in the office and "any-place" participation. Hybrid working and education have their own specific requirements for the information and IT facilities for employees and students.With the desire for "any-place" the need for "any-time" also grows, which could lead to 7*24 services.

Selection of current or planned projects:
- EDIS: Set up 17 Hybrid meeting rooms as PoC.
- EDIS: Implement and expand the M365 platform.

Actions:
- Collect experiences with resources to support hybrid working by Information Managers as input for vision formation and design of hybrid work and meeting spaces in collaboration with Executive Board, director EDIS, director RE&F and the directors of faculties and services.
- Develop a vision with the directors of faculties and services based on a 7*24 service model and explore the possibilities for agreements with international suppliers to enable 24*7 services, where high-quality service management in the field of security is also implemented 24*7.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal Employer appeal.

Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Making full use of the digital era*.

Strategic dialogue: These topics are part of the strategic themes *Information & Communication Management* and *Facilities & Property Management*.

4.2 Towards more integrated services

A look outside

Successful digital services at commercial companies focus on ease of use. So personalised, self-services, Any Place/Time/Device and with a minimum of administrative actions. It should not cost the customer any effort to use the service. The customer does not notice that this service is provided via a chain of activities in underlying processes and partial services of suppliers. Convenience and reliable delivery are crucial.

To keep up with this development, it requires our business operations to critically consider each service and product. We need to determine to which integral process it belongs, seen from the perspective of the people who use these services. This aligns with the vision of Professional services: "To provide a strong operational backbone, worthy of the digital age."

Inspirational example: ***EdTech @ Fontys***

Fontys believes it is important that students, lecturers and employees are supported in developing good ideas to innovate or improve education. To make this possible, an innovation process has been designed in which the initiator is supported in coordination with all relevant expertise such as privacy, security, information management, process owner, etc. By completing a quick scan, lecturers and students can submit proposals throughout the year. Fontys also offers an EdTech minor that is especially suitable for working on innovative ideas of which no examples or prototypes are yet available. The minor helps to validate the concept and to stimulate entrepreneurship.

Niels Bergervoet (2021). Domeinarchitect EDIS

Inspirational example: ***Newly employed at EUR***

Consider the influx of employees where the faculties and the central services of RE&F, EDIS and HR provide the partial services to the new colleague who will work at EUR. An inviting integrated service is crucial as a first experience with your new employer.

4.2.1. Towards faster service development

The need for adapted or new services is expected to increase, also within our institution. At the same time, the needs for adaptation are not the same for all forms of support. This requires a different approach to service development, which is more short-cycled and in which the wishes of the target group are continuously tested ('fit for purpose'). This assessment takes place through continuous cooperation and involvement of both the information and IT side, as well as the users and owners of the service, during the entire realisation cycle from idea to utilisation. This drives towards a continuous feedback loop and learning process towards better understanding what works within a certain process.

The EUR has also shown that with united forces, it can make services operational and put into use at a brisk pace, such as MS Teams, digital signing, remote testing and recording lectures in the studio. One of the ingredients for this success turned out to be the intensive collaboration from different disciplines (the Multi-Disciplinary Teams formed by necessity) and a short-cycle delivery.

Strategic pillar EDIS

More Agile: short cycle working with and delivering to the faculties.

Not all EUR processes are or can currently be optimally supported by the existing business systems. There are opportunities to deploy the current systems more widely, to make better use of the functionality and to exchange knowledge about this. Parallel, a digitalisation platform can be used to create new services in a short cyclical manner together with the users, in addition to the large business systems. For both the wider use of existing systems and the introduction of new ones, a need for a higher capacity for change is apparent.

An example of a current project. JZ and HR for the entire EUR: Make it possible to use legally valid digital signatures. (Digital Signing).

Actions:
- Exploring the added value of Multi-Disciplinary Teams consisting of information and IT experts and process and user expertise discussed with EDIS and the directors of operations for innovation and operational tasks.
- Introducing a short cycle working method discussed with EDIS and the directors of operations.
- Setting up a digitalisation platform, technology, and I-organisation with faculties, discussed by EDIS and the directors of operations.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal Smooth interaction between services and processes.

Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Interaction with the primary process*.

Strategic dialogue: This topic is part of the strategic themes *Business Capability Management* and *Information & Communication Management*.

4.2.2. The provision of services in chains

Partnerships are emerging, such as the strategic partnership between EUR, Erasmus MC and TU Delft (Convergence), on the basis of which new services will be organised. In addition, higher education sector facilities are under development (eg HOSA). To make better use of generic services in the shared service chain of the future, it is necessary to start harmonising our internal processes and data sources in due time and increase "interoperability". The pursuit of 'single storage, multiple use of data' is related to the smooth exchange of information, interconnecting systems and connect to external information sources.

Strategic pillar EDIS

Basics further in order: **stability & continuity** continue to demand direct attention.

Harmonising existing processes and data sources is a precondition not only for the connection to external services, but also for an internal efficient and comprehensible service. And focus on at the internal chain which provides the service. The dialogue about harmonisation between all those involved in the processes is important here. This can also provide an efficiency boost and work pressure reduction through process automation. Manual tasks could be replaced by monitoring and advisory activities.

A university does not have to design all the processes itself and she can use standards. Moreover, collaboration with other universities and evolve into a network organisation. Gaining an insight into our entire network means that we can make maximum use of the contacts that have been established and make good use of contracts, covenants, and agreements that we have signed in cooperative ventures.

Selection of current or planned projects:
- M&C: Implementation of a new CRM system for prospects, alumni, and business relations.
- CPC: Automation and harmonisation of the EUR Budget Plan process.
- HR, ESA, M&C, EDIS: Innovation of the Identity Management process and ecosystem.
- RSM: Contract life cycle management

Actions:
- Efficiently organize data-driven processes and services for business operations and develop new services in consultation with the directors of faculties and services. Among other things, this can be done by:
  - Optimisation and more efficient execution of existing processes using Robotic Process automation (RPA) and Machine learning (ML).
  - Further development of current services from the central service organisation of HR, RE&F (incl. purchasing), Finance, M&C and EDIS to a more customer-oriented, omni-channel digital service (service integration).
  - Working in end-to-end process chains, in which central staff services and faculties are actors, whereby underlying suppliers provide appropriate partial services.
- Developing relationship management and CRM for target groups in an international context (target groups other than Students/Alumni in consultation with M&C and the directors of faculties and services.
- Contract management for all external parties with whom agreements, contracts or covenants have been established. National and international. E.g., research partners, governments, private companies (in addition to the (P2P) contracts we have with suppliers). To be discussed with the directors of faculties and services.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Smooth interaction between services and processes*.

Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Interaction with the primary process*.

Strategic dialogue: These topics are part of the strategic themes *Business Capability Management and Government, Public & Stakeholder Relationships*.

4.2.3. Services that are safe and resilient

We need to protect our (personal) data to guarantee good services. This requires a coherent system of measures to make EUR more resilient to cybercrime.
Because digital services are built up from multiple processes and systems and several departments work on them, a secure information exchange and safe reuse of information from source systems is essential. The downside of information exchange is a higher risk of data loss. Operational services require a balance between ease of use and protection. In addition to information security, this also includes requirements from the perspective of privacy and archiving. To work safely, it is important to continue to invest in awareness and conduct developments in line with the Zero trust policy.
All aspects combined lead towards integrated risk management.

Example of a completed project. EDIS: Configure SIEM SOC for monitoring and detecting unusual activity on the campus network.

Selection of current or planned projects:
- EDIS: Configure MFA (Multi Factor Authentication) for employees and students.
- EDIS: Configure mobile device management.

Action: Strengthen information security measures against cybersecurity and implement the information security policy, which includes:
- Securing and monitoring the use and exchange of data between systems.
- Continuing the awareness campaign and implementing zero-trust policies.
- Preventing data loss by means of malware detection on all devices in the network.
- Preparing an analogue backup plan.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Alignment with digital society.*

Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Organisational change.*

Strategic dialogue: This topic is part of the strategic themes *Corporate Governance* and *Information Management.*

4.2.4. Oversight and sourcing

By using external expertise and capacity, our university can increase its flexibility and thus promote agility. There are now sufficient parties that are specialised in generic services for business operations. Some also have experience in the education sector. In addition, SURF continues to expand and improve its available services.

This will enable the EUR to make conscious choices and consider for each service whether the most appropriate solution is purchasing, collaborating, or developing and delivering services ourselves. A sourcing strategy helps to make coherent choices for cloud facilities and services. A broader use of cloud services will put a greater emphasis on the coordinating function for the purchased services that are delivered to EUR. Oversight means both managing quality, preventing a proliferation of suppliers, as well as testing and monitoring whether our data is sufficiently protected at the supplier's. Part of this involves being able to monitor the use of systems and scale services up and down flexibly according to demand This coordinating task does not only apply to the systems that support primary processes, in particular, to systems that support the more transactional (HR and financial) processes.

Strategic pillar EDIS

More **Cloud** to increase agility and standardisation.

Manage outsourced services instead of doing everything yourself.

Selection of ongoing or planned projects
- Finance department: Optimise the end-to-end process from order placement to payment and improve the legality of purchases and orders. (Proactis).
- Finance & HR department: Innovation of core processes and systems for Operational Services (SAP).

Action: Increase the control function on outsourced IT services by the different Professional Services– for example, by means of a higher level of service – by offering greater flexibility.

But also, more insight into the quality and management of the cloud services offered.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Alignment with digital society.*

Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Making full use of the digital era.*

Strategic dialogue: This topic is part of the strategic dialogue about the impact of coordination on the theme of *Information & Communication Management.*

A look outside

As more and more processes are carried out digitally worldwide, there is growing experience of how the information can be used for a more customer-oriented service. It becomes possible to continuously adjust, and even predict what will happen to an organisation. This will make earlier anticipation possible. Information in combination with filtering, estimating, and analysing has become a service.

Challenging view: ***Data-controlled or data-driven?***

Data-driven working requires an organisation to use the information in a different way. A data-driven organisation derives its goals from the data, whereas a 'traditional' data-controlled organisation uses management information to test whether the predetermined goals have been achieved.

4.3.1. Insight into processes

In a digital environment, the key question for handling requests, steering, and making policy choices is: can the employee, student or party concerned access the right information at the right time? While executing the process or monitoring the process. This applies to all employees and students. To achieve this, the information needs must be clear, and the data must be available in an appropriate format. Important conditions are good data quality, performing accurate analysis and interpretation of the data and that privacy and security are guaranteed. Data classification is necessary for drawing up an accurate risk profile and taking appropriate measures. The more the organisation starts to rely on the data when making decisions, the more important the ethical side and the good management of data becomes. When the quality is sufficient and the guarantees based on ethics and protection are organised, the possibilities for fact-based measurement and improvement of services are widespread. A transformation to a data-driven organisation can be initiated.

4.3 Towards process and data-driven working

Selection of current or planned projects:
- BICC/RI: SDG Sustainable Development Goals rapportage
- BICC/RI & HR, Finance department: Analytics dashboard
- BICC/RI & RSM: Accreditation project & Strategic Dashboard

Actions:
- Improving the quality and accessibility of data sources (incl. classifying and protecting data by implementing privacy policies and information security policies).
- Implementation of business rules for sustainable storage and timely deletion of data and content.
- Efficiently organize data-driven processes and services for business operations and develop new services.
- Measuring and PDCA control for services.

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Smooth interaction between services and processes.*

Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Professionalising PS.*

Strategic dialogue: This topic is part of the strategic dialogue about the impact of data-driven working practices on the themes of *Information Management* and *Corporate Governance.*

4.3.2. Smart Campus as a source of information

The arrival of smart buildings and smart equipment makes it possible to support employees and students during their presence on campus. Erasmus magazine has been providing a beautiful map of the campus site for years. With wayfinding and routing, we can support the (new) students and employees digitally as well as physically, so that they can easily get to the right location.

Inspirational example: ***Library app shows students the way***

To support students in finding books in reading rooms, the university library of the University of Groningen has added way-finding functionality to their app. If a book is found on the shelf in one of the reading rooms, the user can request the way to that book. A floor plan of the building is then shown for each floor, with arrows pointing the way. In addition to the location of a book, the app can also indicate the route to the nearest coffee room, the toilets and the printing rooms.

Arjen Voogt (2021)
IT Manager Onderwijs EDIS

Sufficient technology is now available for the maximum utilisation of spaces and the sustainable use of spaces and buildings to be able to take major steps in this direction. Current building management systems generate sufficient data to initiate smart choices and smart usage and adaptation of the buildings. A large part of the buildings will last for years to come and offer opportunities for adaptation so we can meet the Sustainable Development Goals of the Universiteiten van Nederland (formerly known as VSNU). It requires choices, a solid infrastructure, and new operational aspects, which will ultimately benefit the employee, visitor and student.

Example of a selection of planned and current projects.
- RE&F: Applying physical signage and ensuring a consistent designation with an international image.
- StepUP project by RE&F: Smart Campus & Innovation Hub with connected field lab.

Actions:
- Developing digital Wayfinding & Routing vision formation with the directors of faculties and services.
- Vision on adaptation to buildings towards the Sustainable Development Goals from RE&F.

- Developing and implementing a vision from RE&F and EDIS on a Smart Campus infrastructure that will provide insight into occupation of work and study places, access to buildings and workspace, sustainable building design (using the possibilities of IoT, AI, Visual Realities, Extended Augmented reality and Digital twins technology).

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Alignment with digital society*.

Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Organisational change*.

Strategic dialogue: This topic is part of the strategic dialogue about the impact of a data-rich environment on the theme of *Facilities & Property Management* and *Information & Communication Management*.

Selection of ongoing or planned projects:
- EDIS: Ensure sufficient streaming capacity (IP connection over EUR net) for the studio cameras, among other things.
- EDIS: Sustainable data centre management. (hybrid data centre)

Action: Invest in an efficient IT service (IT4IT).

EUR Strategy 2024: This topic can contribute to the realisation of the stategic goal *Sustainability as a prerequisite*.

Stepping Up Professional Services: This topic can contribute to the realisation of the agenda item *Organisational change*.

Strategic dialogue: This topic is part of the strategic dialogue about the impact of sustainability on the theme of *Corporate Governance*.

4.3.3. Towards a more sustainable IT

In 2021 world leaders gathered in Glasgow and (especially) young people are calling for a green revolution. There are many green initiatives on campus, in line with EUR's objectives. We see that IT systems and data storage worldwide are experiencing an increasing energy consumption. Digital exchange of information prevents paper use, but digital data is stored, transported, and processed in increasing amounts Keeping software, cloud services and systems available that are hardly used or have already been replaced requires management as well as the use of environmentally damaging resources. By deleting information in time or transferring it to the National Archives, applications that are no longer used can be turned off. We have a large and diverse application landscape, where we demand speed and reliability of information. Due to increasing continuity requirements, we need data centres at multiple physical locations. Energy consumption is increasing, while this is not desirable from a sustainability point of view. This requires choices, with sustainability being one of the assessment frameworks.

Overview topics for strategic dialogue

Digitalisation has an impact on all kinds of aspects of our organisation and is more than information and IT. This chapter describes several actions that fit within several larger themes. These themes could be placed on the agenda for further debate during regular consultations with the faculty and service directors.

Business Capability Management: Activities aimed at understanding, prioritising, supplying, and managing the capabilities required to support the strategy and vision, such as process management, service management, quality management.

Corporate Governance: Activities aimed at implementing and complying with laws, regulations, and internal policies, including risk management and business continuity.

Facilities & Property Management: Establish a suitable property and facilities business that is ready for the future and that complies with laws, regulations and internal policies for property and facility services, including health and safety standards.

Finance Management: Arrange for effective and efficient financial management so that the organisation can achieve its goals.

Government, Public & Stakeholder relationships: Continuously maintain a healthy relationship between the organisation and its students, employees, and other internal and external parties.

Human Resource Management: Organise and support employees and their contribution to the organisation.

Information & Communication Management: Ensure the effective and efficient development, delivery and management of ICT resources and access to those resources.

Information Management: Obtain, store, use, archive and delete all types of information in the organisation. In doing so, manage the data as formulated in data governance, data security and data management policy.

Legal Services: Ensure that legal advice is available.

Appendices

Appendix 1. Relation EUR strategy 2024 and State of Digitalisation

Goals EUR Strategy 2024	Topics State of Digitalisation
1 Fostering our societal impact identity	
1.1 Accommodating impact	2.3.1. Developing and supporting Erasmus Research platforms 3.1.1. Developing and supporting sector-wide Research and Education platforms
1.2 Advancing impact	2.3.2. Supporting knowledge infrastructure Rotterdam 2.3.4. Supporting Impact at the Core
1.3 Accelerating impact	2.3.1. Developing and supporting Erasmus Research platforms 2.3.3. Supporting culture campus 3.1.1. Developing and supporting sector-wide Research and Education platforms
2 Ensuring our education is future-oriented	
2.1 Engaged and challenged by societal changes	2.1.8. Design-oriented education 2.3.3. Supporting culture campus 2.3.4. Supporting Impact at the Core 2.3.5. Convergence / Interuniversitary education 2.3.6. Supporting Open Pedagogy
2.2 Personal learning, personal leadership	2.1.5. Enhancing education through digital testing and alternative forms of examination 2.1.6. Enhancing education through EduBadges 2.1.11. Supporting lifelong learning
2.3 Becoming an Erasmian	2.2.1. Empower staff and students through the provision of digital skills training
2.4 Erasmian education	-
2.5 Personal and personalised learning	2.1.1. Enhancing education through study data & Artificial Intelligence 2.1.11. Supporting personalised learning
2.6 The inestimable value of alumni	-
2.7 The importance of lifelong learning	2.1.2. Enhancing education through video 2.1.3. Enhancing education and research with design application 2.1.4. Enhancing education through online practical skills acquisition 2.1.5. Enhancing education through digital testing and alternative forms of examination 2.1.6. Enhancing education through EduBadges 2.1.9. Supporting online-only leren 2.1.12. Supporting lifelong learning
3 Embedding excellent academic research in society	
3.1 Attracting top researchers worldwide	1.3.1. Increasing the visibility of researchers and their output 1.3.2. Increasing exploitation of scientific insights

Goals EUR Strategy 2024	Topics State of Digitalisation
3.2 Superior support for researchers	1.1. Enable new modes of research especially across disciplines 1.2. Promote new ways of generating, curating, and engaging with data 1.3. Extend the reach and effectiveness of scholarly communications
3.3 Open and responsible science	1.1.2. Supporting new modes of drafting and reviewing (multidisciplinary) research proposals 1.2.3. Supporting new ways of generating, curating, and engaging with reserach data 1.2.5. Supporting new ways of archiving research data
4 Taking responsibility on sustainable development	
4.1 Contribution to Sustainable Development Goals	-
4.2 Education for sustainability	-
4.3 Sustainability as a prerequisite	4.3.3. Towards a more sustainable IT
5 Investing in our people for the future	
5.1 Leadership	2.2.2. Stimulate development transformational leadership
5.2 Career and talent development	-
5.3 Employer appeal	4.1.3. Supporting hybrid ways of work
6 Stepping up our professional services	
6.1 Smooth interaction between services and processes	4.2.1. Towards faster service development 4.2.2. Stimulating provisioning of services in chains 4.3.1. Stimulating insight into processes
6.2 Alignment with digital society	4.2.1. Towards faster service development 4.2.3. Stimulating development of services that are safe and resilient 4.2.4. Strengthening oversight and sourcing 4.3.2. Smart Campus as a source of information
6.3 Customer-driven	4.1.1. Channelling customer needs
Agenda Stepping Up Professional Services	
1. Making full use of the digital era	4.1.2. Towards transparent working practices 4.1.3. Hybrid working 4.2.4. Oversight and sourcing
2. Leadership	-
3. Interaction with the primary process	4.1.1. Channelling needs 4.2.1. Towards faster service development 4.2.2. The provision of services in chains
4. Professionalising PS	4.3.1. Insight into processes
5. Organisational change	4.2.3. Services that are safe and resilient 4.3.2. Smart Campus as a source of information 4.3.3. Towards a more sustainable IT

Appendix 2. Acronyms explained

In this State of Digitalisation acronyms are used to refer to (sub-)departments or schools within the Erasmus University.

An overview of acronyms used in alphabetical order:

- AA: Academic Affairs
- BICC: Business Intelligence Competence Centre
- CLI: Community for Learning and Innovation
- CPC: Corporate Planning & Control
- EB: Executive Board
- EA: Erasmus Academy
- ECDA: Erasmus Centre for Data Analytics
- EDIS: Erasmus Digitalisation and Information Services
- ERS: Erasmus Research Services
- ESE: Erasmus School of Economics
- ESL: Erasmus School of Law
- ESHCC: Erasmus School of History, Culture and Communication
- ESHPM: Erasmus School of Health Policy & Management
- ESSB: Erasmus School of Social and Behavioural Sciences
- ESPhil: Erasmus School of Philosophy
- EUC: Erasmus University College
- E&S: Education and Student Affairs
- HR: Human Resources
- ISS: International Institute of Social Studies
- LA: Legal Affairs
- RE&F: Real Estate and Facilities
- RSM: Rotterdam School of Management, Erasmus University
- UL: University Library

Appendix 3. Bibliography

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