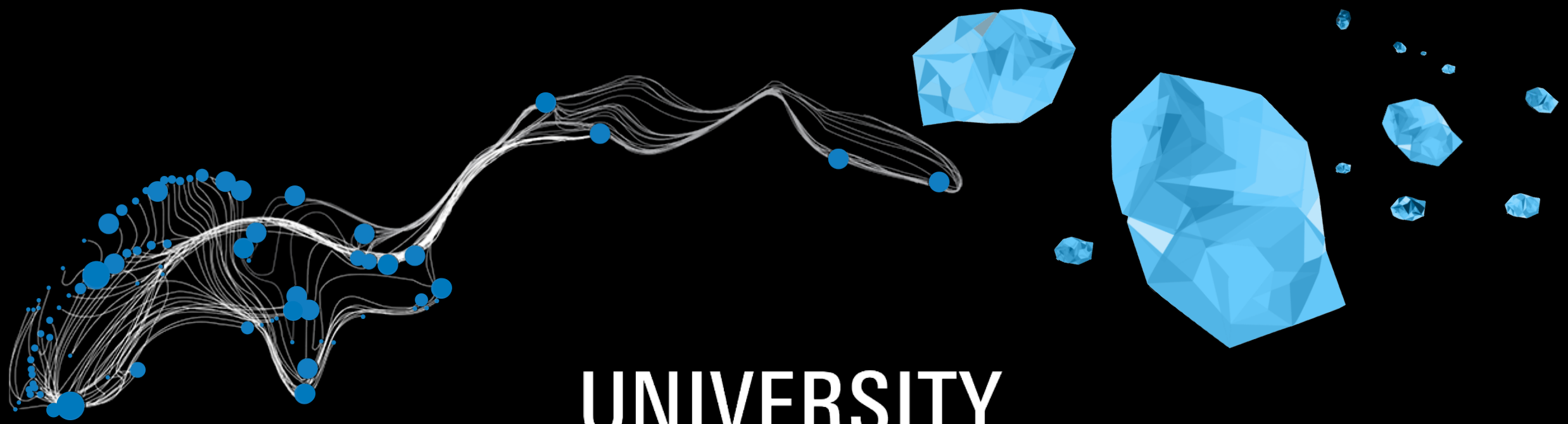
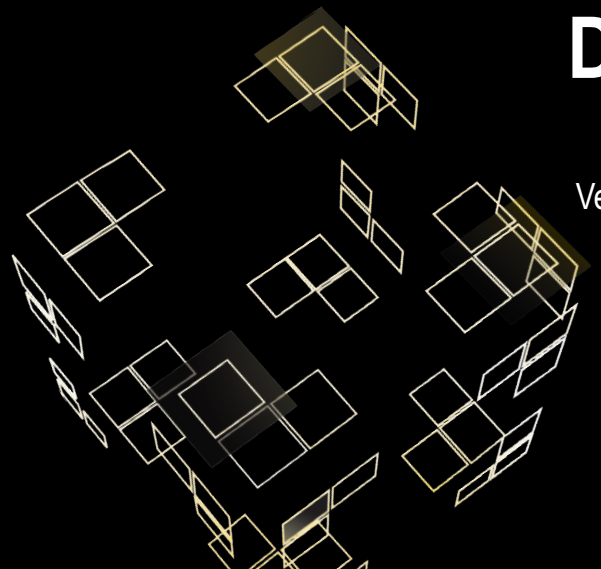
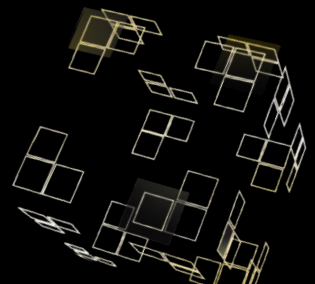


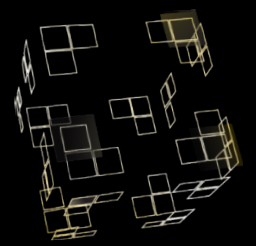
UNIVERSITY OF TWENTE.

Digitalisation vision

Version 1.0







Foreword

The digital transformation laid out in this document represents a journey for our university.

The visions, ambitions and roadmaps in it are meant to inspire us on this journey and to challenge us to rethink how we work today and how we could do things even better.

The starting point of our digital transformation strategy is “People First”. This implies that we want to make this journey together with our people - our employees and students. Not only, because we are a people first university, but because together we ARE the transformation we want to make. Together we shape who we will become as a digitally empowered university.

The speed of new technologies and changes that come with digital transformation may seem daunting at times. It is our challenge as leaders of this transformation to make people feel safe in this journey, connected to our vision, comfortable with our actions and happy to do their part in making this transformation a success.

Creating an entrepreneurial environment that invites to experiment and explore without hesitation is an essential part of that. It will enable us to learn fast and to keep moving forward.

Let’s encourage, inspire and challenge each other on this road into the future and embark on this exciting journey together!

SEG Digitalisation

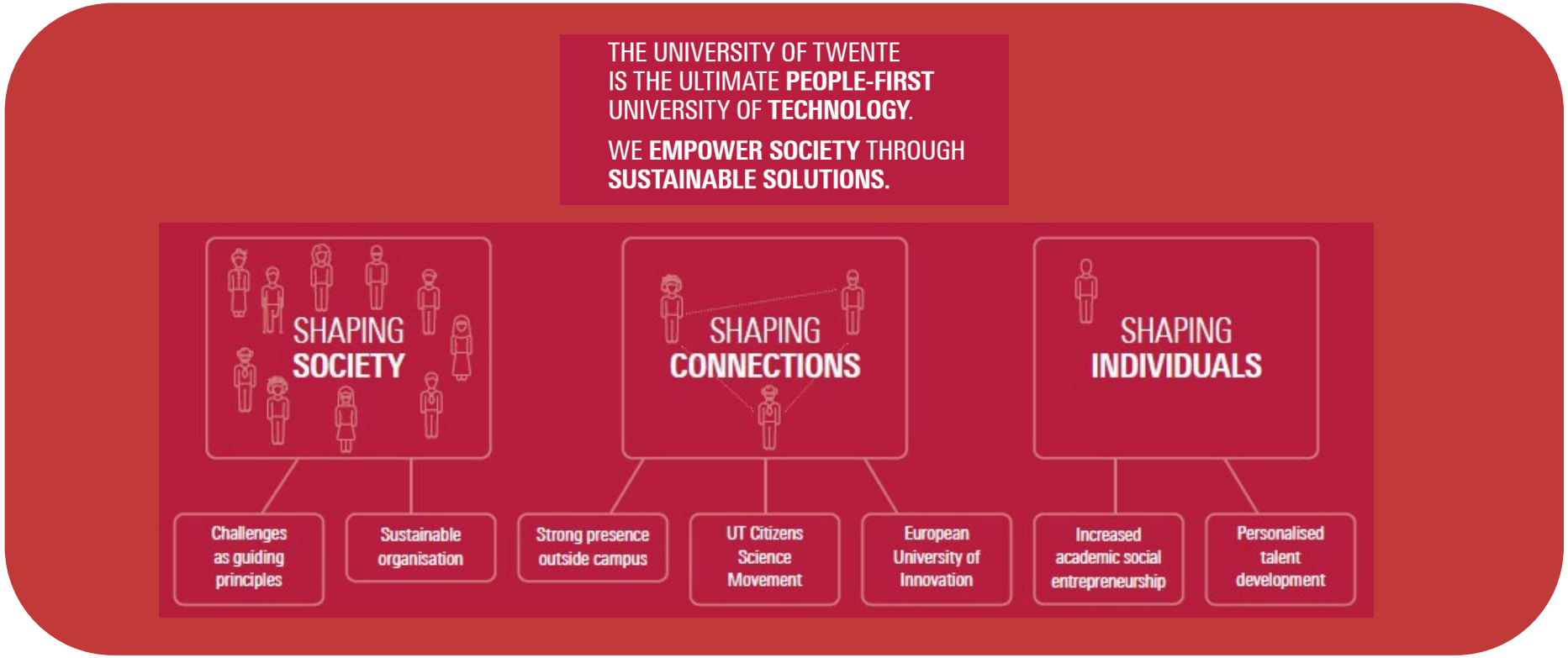
Index

UNIVERSITY OF TWENTE.

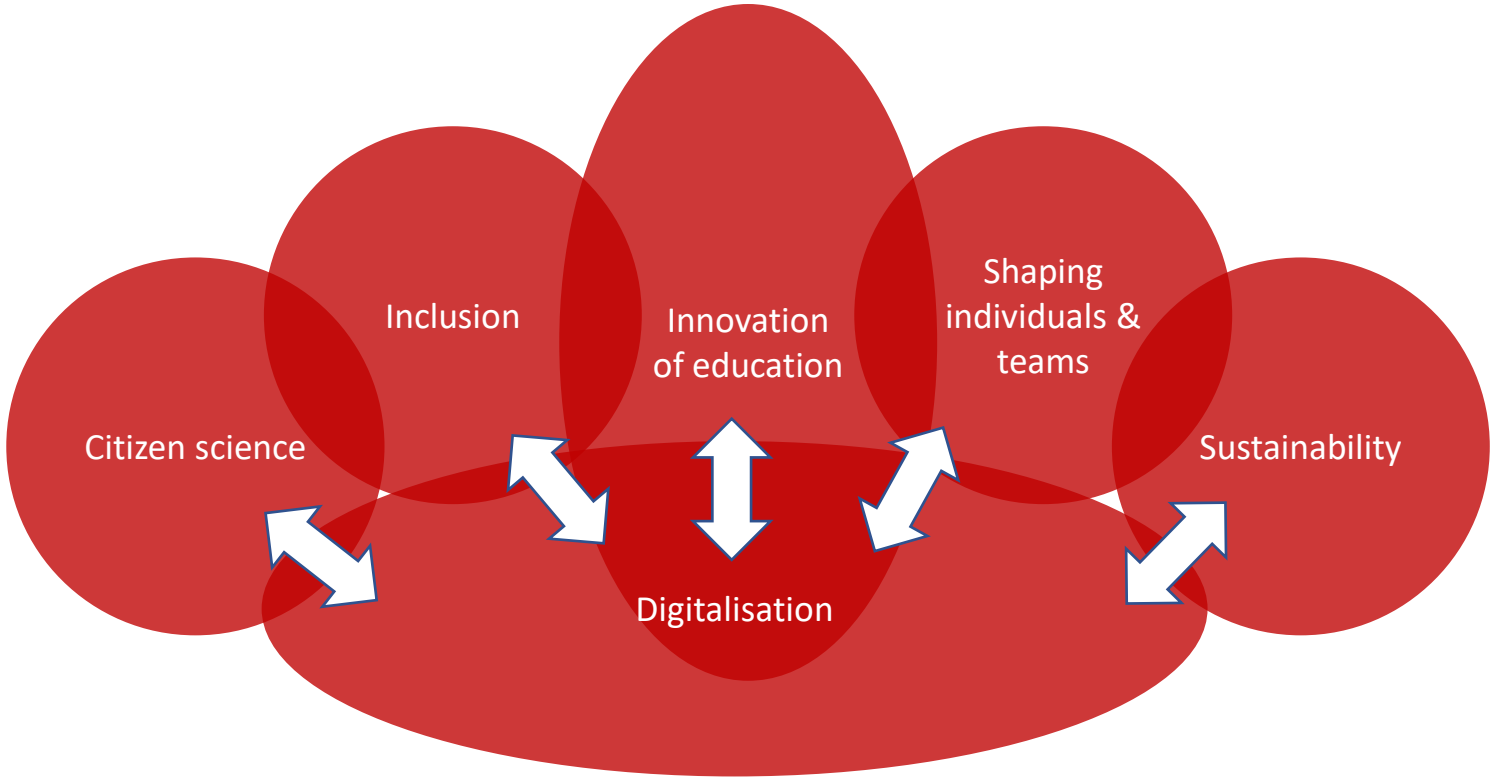
Shaping 2030

Becoming the ultimate people-first university of technology

It is our ambition to become the ultimate people-first university of technology. Digitalisation plays a key role in achieving that. It impacts and connects all fields of our work, has the power to inspire innovation and offers us unique possibilities to reinvent ourselves as individuals, as a community and as a university.



Digitalisation as driver and inspirator for the conceptual transformation of our university



- Six Shaping Expert Groups (SEG's) are implementing Shaping 2030
- Digitalisation touches, connects, impacts and can inspire each individual SEG and enable them to raise their ambitions levels

Belief

The digital world we live in represents amazing, undiscovered opportunities for us to grow, improve and reinvent ourselves as a university. Yet at the same time it poses challenges and threats, both on the technological and the people side. Competitors from unexpected industries enter our market with disruptive business models. More advanced (cyber) threats pop up daily. New technologies become obsolete in a flash. People need (digital) skills tomorrow that don't exist today and steering one's development requires much more than having those skills alone. Hybrid ways of working, independent of time (zone) and place, are becoming the standard and challenges us to find a new balance between physical and digital contact.

If we want to reach our ambitions in this fast and continuously changing, ambiguous world, we do not only need to be ready for change, we need to take charge of it. It is time to build on the digital foundation we have created so far and proactively drive the conceptual transformation of our university. To embrace 'digital' not as a tool, but as part of our very nature. To grow the mindset, skills and agility to become a truly digitally empowered university.

Philosophy

Through our digital transformation, we want to empower our staff, students and partners to successfully, happily and confidently navigate todays and tomorrows hybrid (physical and digital) world supporting them in achieving their objectives and ambitions. We do so by helping them become skilled and self-aware digital natives, developing personalised, reliable digital working and learning environments, enabling data-driven performance, and seamlessly connecting our physical and online world into an always available, smart and intuitive ecosystem: our Digital Campus. A cool and exciting place that serves as a playground for innovation, is a source of valuable data and a cradle for close, long-term personal and business connections. A place that offers a pleasant hybrid way of working and an inspiring high-tech experience to visitors and users alike.

Ambition

It is our ambition to take pole position when it comes to digital transformation in our field. We want to be recognized as the most advanced digitally empowered university, both technologically and conceptually, excelling in security, availability, privacy and user-experience whether on or off campus. Reaching this ambition confirms and strengthens our position as a leader in (global) research collaborations and top ranking as a university.

1. **Intuitive** and **seamless integration** with our way of working

   People experience the use of digital technology and digital processes as a natural fit with their daily way of working.

2. **Flexible** and **adaptable organisational embedding**

   Innovations can be easily tested, evaluated, adapted, and subsequently embedded into our organisation and are scalable by design.

3. **Aimed toward internal and external collaborations**

   Digitalisation fosters collaboration inside and outside UT, realized through strategic private-public partnerships.

4. **Durable and sustainable**

   Designed for reduced environmental impact

- The starting point for this vision has been an external orientation about main (overarching) themes that will drive the transformation of our society into the digital era. We find the following main themes to be most relevant in the near future for our university.
    - Personalisation and wellbeing
    - Digital safety
    - Smart Campus
    - Data driven challenges
- These are divided into subthemes and for each of these the relevance for our business domains (Education, Research, Operations, Infrastructure) has been determined. This is visualised on the next page.

UNIVERSITY OF TWENTE.

Themes

We will drive the digital transformation of our university by focusing on four transformation themes. Each theme builds on several subthemes. Each theme impacts one or all the domains of our work.

Personalisation & Well-being

- Digital well-being
- Personalised learning
- Digital competence

Digital safety

- Digital trust
- Privacy preservation
- Secure infrastructure

Data driven challenges

- Virtual Research Environment
- Digital Competence Centre
- Data driven learning
- Data-driven decision-making

Digital campus

- Smart campus
- Hybrid working
- Smart engagement
- EdTech partnerships

DOMAINS OF APPLICATION: Research | Education | Operations | Infrastructure

Personalisation & well-being

Becoming digital natives

Whilst historically digitalisation contributed towards increased productivity and efficiency, its potential today has already shifted towards tailoring for individual needs and more in general raising the quality of life. This requires that individuals feel comfortable and at ease in this digitalised world.

Becoming digital natives

Our staff and students as the self-confident drivers of the digital transformation of our university

The key to any digital transformation, and especially to ours as a people first university of technology, are people. With digital well-being, staff/students feel comfortable in digital environment. They are skilled enough to get by on a day-to-basis and to see new digital opportunities when they encounter them. If they don't know how or are afraid to use the great new technologies available to them, digital transformation will never succeed.

Being digitally savvy and having a digital environment that is optimally tailored to their own specific needs and demands allows them to happily explore new ways of working together and as individuals. To improve efficiency, productivity and reduce workload. To drive their performance at work and in their daily lives to new levels. And as a result, to drive the digital transformation of our university.

Improving the digital skills and confidence of our students and staff and creating a personalised digital environment in which they feel good and safe is therefore a key pilar in our digital transformation strategy.

We do so by focussing on three topics:

Digital competence | Digital well-being | Personalised learning

Staff and students need to gain digital skills and self-awareness, digital learning environments need to be personalised

Staff and students are digital natives and work in personalised digital environments

Digital competence	Staff/students need digital skills to work efficiently and effectively.	Train	Staff/students feel digitally skilled. They are familiar with digital technologies, work effectively and efficiently autonomously, and have adopted an attitude of continuous learning. Each individual should find out which digital skills could be strengthened (People first). Our University should encourage and support people who would like to find out if there are skills missing and what they can do about it.
Digital well-being	Staff/students don't always feel comfortable in a digital environment and need to gain digital self-awareness.	Empower	Self-aware about digital behaviour, know how to self-reflect and steer own behaviour. Students and staff are feeling self confident. We want to stimulate the positive feelings (being digital savvy) and prevent negative feelings (being afraid, hacked, cyber-bullied, etc).
Personalised learning	The digital learning environment is flexible and technologically up-to-date, but currently not personalised for students.	Enable	Individualized learning for staff and students, on demand lectures, study at your own pace, time and place. Digitalisation can also potentially create opportunities for students to choose their own curriculum. If and how personalised learning should be part of our Digitalisation strategy and our vision on education is yet to be determined.

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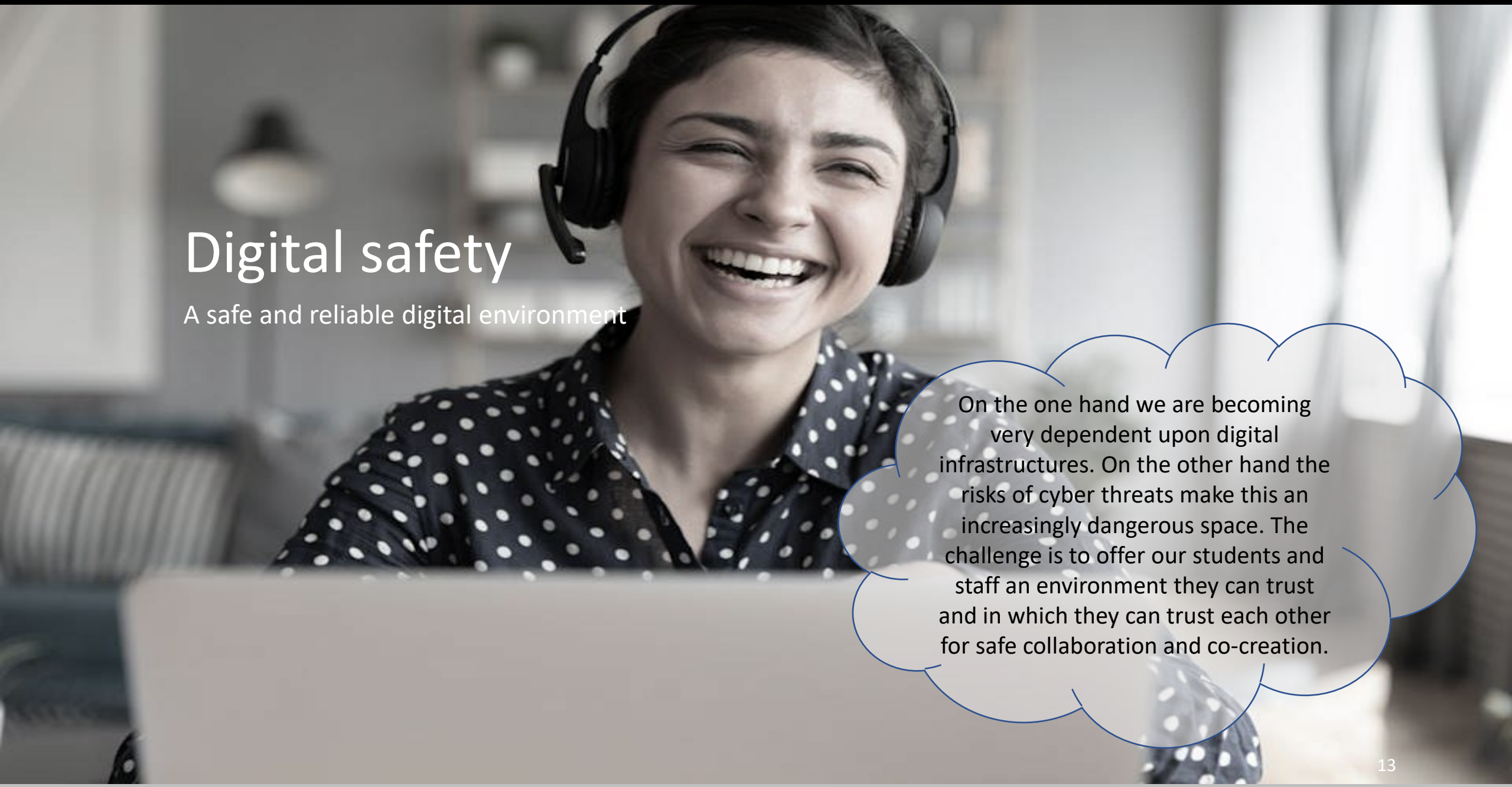


Digital safety

A safe and reliable digital environment

On the one hand we are becoming very dependent upon digital infrastructures. On the other hand the risks of cyber threats make this an increasingly dangerous space. The challenge is to offer our students and staff an environment they can trust and in which they can trust each other for safe collaboration and co-creation.

A safe and reliable digital environment

The UT as an environment in which staff, students and partners *feel* and *are* digitally safe, and contribute to digital safety

Over the last two decades the (online) digital environment has become the heart of our personal and working lives also at our university. It connects and empowers students, staff and our external partners to work, communicate and collaborate any place, any time, any way. Keeping this heart in excellent condition and safe from harm, so that people can rely on it and feel safe in it, is essential to the continuity and success of the digital UT we want to become.

The basis is a secure digital infrastructure that is (as much as feasibly possible) immune to cyberattacks and malware. But perhaps the biggest threat remains human behaviour. A digitally safe university requires digitally safe behaviour from everyone in our user community. Awareness of these threats and one's own behaviour in respect to them are the key to building a culture of digital trust.

Apart from creating a safe and reliable digital environment, learning and cultivating safe digital behaviour is therefore a top priority in our digital transformation strategy.

Our strategy focusses on three topics:

Digital trust | Secure infrastructure | Privacy preservation

Awareness levels regarding cyber threats of staff and students needs to be raised and appropriate privacy behaviour cultivated

Digitally safe behaviour, robust and LEADING secure and privacy-preserving IT-infrastructure

Digital trust	Basic awareness levels of staff/students for digital threats should to be raised and appropriate behaviour stimulated	Empower	Staff and students feel and act digitally safe and as a result trust each other and their working environment
Secure infrastructure	Current secure base is continuously and proactively being adapted to fight off new and fast changing cyberthreats	Facilitate	Leading position amongst peer group of other Dutch universities in advanced robust infrastructures that are secure by design
Privacy preservation	Privacy awareness is there, but needs to be further developed into consistent privacy preservation behaviour as a second nature	Develop	Privacy preservation at the core of our thinking and the centre of our actions, in all our operational processes, education and research and acknowledged by students, staff and the market as leading in privacy preservation

UNIVERSITY OF TWENTE.

Data driven challenges

Insights that drive innovation and performance in all fields of our work

In an increasingly complex world data, and notably information derived from data, is shaping our decisions and oftentimes the quality of those decisions, for better or for worse. Putting data at the core of our digitalisation efforts is crucial for becoming future proof.

The UT as an innovative, high-performant, data-driven working and learning environment

Insights that drive innovation and boost performance in all fields of our work

Adopting a data-driven way of working will help us drive innovation and boost the joint and individual performance of our staff, students and researchers.

Data can provide stronger evidence and insights that will help us all make more informed decisions in all the fields of our work.

For creating this high-performance working environment for our university, we focus on the following topics.

Data driven learning

Digital Competence Centre

Virtual Research Environment

Data-driven decision-making

Untapped potential of our data-driven approach and decision-making

Today

Future

A data-driven learning and working environment based on digital workflows

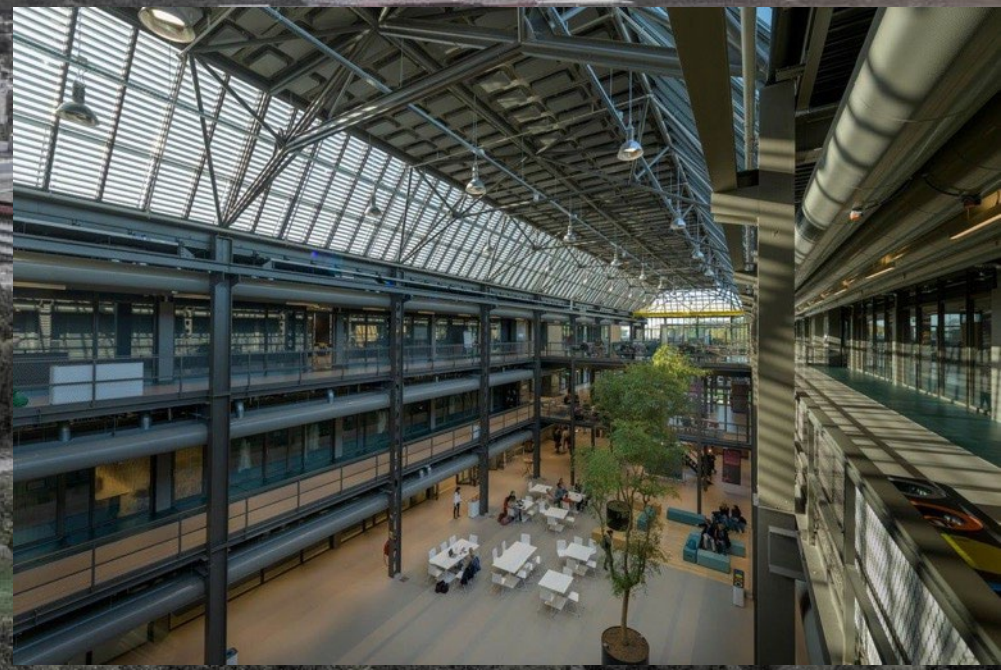
Data-driven learning	Pilot with learning analytics just started	Develop	Students and teachers have fast and accurate insight in individual and group learning performance in order to adapt and improve
Digital Competence Centre	DCC-team in place and ready to start supporting researchers	Develop	DCC as a single and visible point of contact for supporting researchers in digitalising their research
Virtual Research Environment	Two VRE solutions available for staff and students.	Develop	UT wide adoption by researchers and students of VRE facilities across all faculties. Need for more advanced VRE's for the various research domains to be explored.
Data-driven decision-making	Data available, but potential for data-driven decision-making underexplored	Develop	Management decisions are data-driven and based on proactive analysis and forecasting

18

UNIVERSITY OF TWENTE.

Digital campus

Our physical and digital world seamlessly integrated as one



Our physical campus is a unique asset of our university which we foster. We further enrich our campus with the opportunities new digital technologies van offer. Likewise, we develop a campus that allows for digital presence offering an experience akin to the physical campus

A smart, always accessible and delightful working and learning environment and LEADING playground for digital innovation

Our campus as a seamless integration of the physical and digital world

Our campus is our home. We want to transform it into a smart ecosystem in which our physical world and online world seamlessly come together. A cool, exciting and intuitive place that is open 24/7 to students, staff, partners and other stakeholders from all over the world, allowing them to contribute from anywhere at any time. A leading future tech environment that offers the same delightful user experience, whether on or off the physical campus, enables easy collaboration with both internal and external people, and makes us feel close, connected and involved, even when we are physically apart. It is a source of valuable data for scientific experiments and regular business operations, and a playground for testing new ideas and driving digital innovation.

In doing so, we establish a hybrid world unique to the UT that allows for creating a myriad of new opportunities for our users. We create our Digital Campus by focussing on the following topics:

Smart campus | Hybrid working | Smart engagement | EdTech partnerships

Foundation laid for the creation of a digital campus

Seamlessly integrated physical and digital campus with fully hybrid working and learning environment.

Smart campus	Various smart campus digitalisation pilots with for example sensors, 5G, navigation apps	Transform	Mature digital ecosystem of connected platforms and applications (e.g. dynamic scheduling and reservation app). Data is collected, anonymised, enriched and made available for scientific experiments, daily business operations and improving user experiences
Hybrid working	Pilots and experiments including testing of equipment for hybrid lectures and hybrid meetings	Facilitate	Digital facilities (hardware, networks and applications) enable smooth collaboration and interaction without a gap between the physical and online user experience (digital proximity) of both internal and external users; hybrid working as the standard
Smart engagement	Experiments to boost engagement in a digital way by different communities within the UT	Connect	Organised engagement approach empowered by digital tools (e.g. apps and seminars) aimed at creating and nurturing strong and engaged UT communities and long-term bonds between community members all over the world
EdTech partnerships	Basic idea about the potential of EdTech partnerships and possible partners	Develop	Investigate potential collaboration between UT and one or more large or start-up tech companies making the UT being recognized as a driver of innovation in the education market

21

Digitalisation per domain

In this section describes the vision for the domains Research, Eduction, Operations and Infrastructure.

Elements taken into account in this vision are the impact of the main themes, external developents and digitalisation trends.

Research

Education

Operations

Infrastructure

The UT has a good starting position because of steps already taken in all domains

Education
Significant steps have been made in the past year with Education innovation with IT. The TELT-team (Technology Enhanced Learing and Teaching) played an important role in facilitating this process.
The UT is actively involved is the “Versnellingsplan Onderwijs innovatie met ICT”, in the “Docent professionalising” initiative.
Canvas is an open LMS and provides a good platform for continuous improvement and enrichment of the Education tool stes and IT-landscape.

Research
The Digital Competence Centre (DCC) for Research Support started last year and is fully up and running, working embedded in the faculties with central coordination and information sharing. Several pilots and experiments are already started to explore and develop IT-facillties for the digitalisation of research.

Operations and Infrastructure
With he replacement of core systems for HR and Finance the basis laid for a future proof It-landscape for Operations. The IT-infrastructure is continuously being updated. The UT is well ahead of peers with a safe and reliable IT-infrastructure. This is reflected by yearly IT-audits, benchmarks, certified data storage and yearly security penetration) tests

Education

Digital transformation potential

From all domains the domain of Education will certainly be most impacted by the digital transformation and disruption. New players are already entering the educational markets and also some universities have already made radical decisions to transfer from traditional education to a fully digital model.

New tools for digital collaboration offer new possibilities to completely redesign educational processes. New technology is offering a huge potential for enrichment of the learning process and for personalised learning. This can give a boost to study success, more fun, excitement and engagement for students. The main drivers for change will be that digitalisations not only offers possibilities for, time, location and place independent learning, but also age independent (Life long learning) and resources independent because of the scalability potential. Learning materials can with minimal effort be modularised and reused in different learning propositions for different target groups.

Still to be decided (not by the SEG but in the relevant gremia):

- What does a hybrid classroom look like and which facilities are needed?
- What is UT vision on the future of physical lectures (hoorcolleges), to what extend will they go “digital”?
- How to combine the strength of our campus with digital education?
- What is our vision on challenge based learning and which are the requirements for digitalisation?
- What is the implementation plan and planning for life long learning and how will it change the digital support landscape?

Innovation support with IT

The multidisciplinary TELT team is the central place for education innovation with IT. The team works demand driven and supports teachers in their whish to improve their education with technology. This demand driven innovation led already to many innovations and enrichments for the IT-edcation landscape.

The demand for the services of the TELT team is rising steeply as teachers are experimenting more with IT driven by Corona.

Benefits of the experimental way of working are the fast learning curve, learning from practical experience, flexibility, budget and resources avaible upfront for idea's yet to come.

Attention point is the transfer from succesfully completed experiments to the support organisation. The additional capacity needed to take over support activities from TELT are often not available in CES and LISA.

Available today

- Learning infrastructure is in place with Canvas as LMS and Osiris as SIS and various other applications
- Zoom and Teams available for digital classrooms
- Digital testing environment in various forms available

Near future requirements

- More advanced video platform
- New scheduling system

Expected Future requirements

- Connection to ECIU IT-landscape
- Life long learning platform
- Hybrid classroom platform that can be easily equipped and extended with IoT devices

UNIVERSITY OF TWENTE.

Research

Digital transformation potential

Although not changing the fundamental research as such, digital transformation in research will change the way in which research projects are being conducted. For example, we can expect that much more effort is paid to making data FAIR and to making setups (including data analyses methods and techniques and their implementations) open. At the same time, a myriad of (open) shared instruments will be used, ranging from simple collaboration tools for writing articles to advanced shared data analyses tools to shared repositories to shared modern hardware, all offered as cloud-hosted services.

Challenging will be the cases when having to deal with data sets distributed across multiple locations. We will be witnessing situations in which computations need to be brought to the data instead of the other way around. New security aspects will need to be addressed, as well as new types of collaborations to allow foreign code to act on privacy-sensitive data that is stored on UT premises.

Along the same lines, we will be witnessing that many physical laboratories will be highly virtualized, including ours. We will be able to conduct chemical experiments in Japan from our own premises while South African researchers will be training and controlling our robots through a cloud interface. Likewise, regional and international companies will have access to our Hybrid (digital and physical) Campus that acts as a Living Lab for a range of socio-technical experiments.

These are technologically demanding issues, yet they will eventually become reality. Equally demanding is ensuring that the current, but above all the next generation of UT citizens have the proper mindset, attitude, and skills to make the move forward. Ideally, the transformation itself works as an attractor to the best minds.

Research support

In the research strategy of the UT the importance of the Digital Competence Center (DCC) is more elaborately described. The DCC should support the application of digital technologies in research. The following functions of the UT-DCC are included in UT's research strategy:

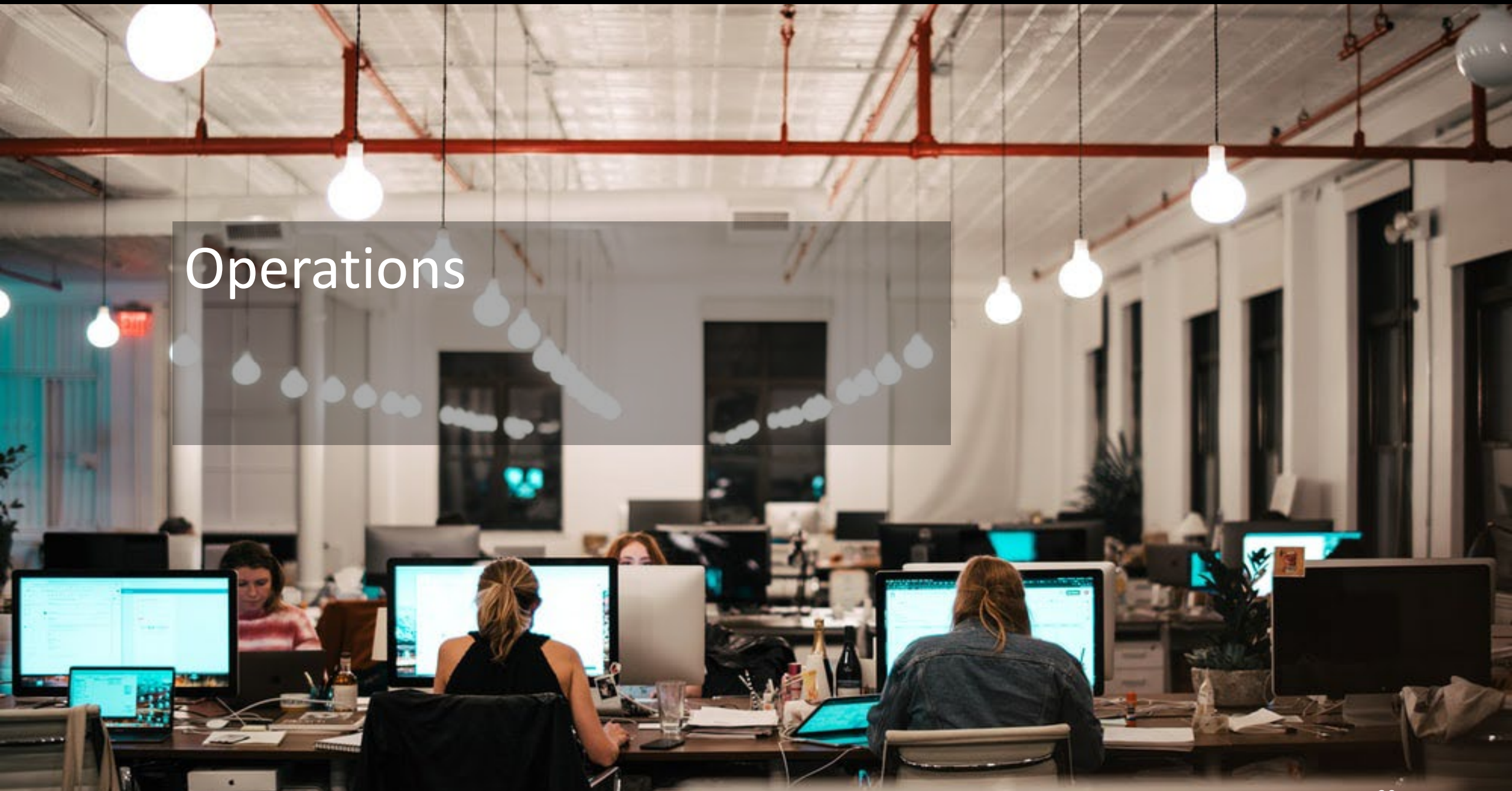
- A secure storage of research software and research data, both during and after the research, where access for third parties should be possible
- Support and advice for FAIR research data.
- Tools for analysis and visualization of research data, using the existing knowledge of big data and data science at the UT.
- Computing power, including access to HPC facilities and cloud-based special purpose hardware.
- Close monitoring of new developments in digital technologies.

Research digital infrastructure

Once and for all, we need to pay significant attention to a surprisingly big hurdle: the idea that digital infrastructure is (only) about hardware. A digital infrastructure is about resources, facilities, and services. Many of those facilities relate to hardware and will be cloud-based. Long-term investments will be largely replaced by subscriptions to state-of-the-art online services. It is important that we have excellent insight in what is needed, what can be offered now and in the near future, and equally at which price. We will also need to explore public-private sharing models, in which our (business) partners join in sharing and paying for infrastructure.

Meanwhile, we should set up Virtual Research Environments (and probably different ones), along with sufficient training. Special attention is needed to ensure those VREs are open for our partners. Effort is needed to make our repositories part of federated infrastructures such as EOSC or iRODS. Secure storage and interfacing is essential.

Likewise, we need to pay attention to providing external (digital) access to our own lab facilities, which is part of constructing a Digital Campus.



Operations

Digital transformation potential

The transformation of operations is a gradual process that in fact is already taking place quite a while. This process is a balance between operation innovations and keeping existing services up-to date and adapting to changing law and regulations. In the past, the focus was on automating operational processes and elimination of repetitive manual tasks. More recently the focus was on self service. In the near future data, AI and robotics are the potential disruptors.

Operations way of working

Guiding principles for operational processes

1. Simplification and ease of use
2. Integral design of process chains (across departments)
3. Ongoing (gradual) improvements
4. Standardised one way of working for decentralised processes (e.g. functional management (functioneelbeheer))
5. Flexibility and agility

Operations digital infrastructure

Current status

- After the go-live of the core applications AFAS, ProActis and Unit4 the basis infrastructure will be up-to-date
- Focus on Increasing user friendliness of core applications

Main future requirements

- Hybrid meeting and project rooms
- Improved decision making with BI platform
- Better space utilisation with online reservation and monitoring

Infrastructure

Digital transformation is already happening

The infrastructure landscape is transforming rapidly. Cloud services are becoming more dominant, many applications are or will be only available as a cloud (SAAS) services. The responsibility of the UT is to integrate the multi cloud platform into an application landscape working seamlessly together. Security, privacy and identity and access management should be working in conformity with UT policies and standards on all of these platforms. Not everything is or will be moving to the cloud, sensitive research data may require that data is stored on UT platforms. In our definition infrastructure is not only about hardware, but also very much the people and processes that together ensure that the infrastructure is well managed and working properly.

Trends and developments

- Cyber security is the becoming the predominant concern
- New business models for cyber criminals
- Stately actors becoming more aggressive
- Ongoing innovations in cyber defence

Generic digital infrastructure

- Management of cloud services
- Networking and connectivity
- On campus infrastructure (data centers)
- IT infrastructure for Research

Next steps

- After consultations with Faculty boards, service departments, other Shaping Expert groups, a working group of the University council and the Executive board, this final version will be put forward for consent of the University council and decision making by the Executive board.
- For the realisation of this vision yearly roadmaps have been defined. These roadmaps contain both the strategic priorities as well as other “must do” projects. The roadmaps are a separate document.