



## Digital Society Initiative

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# DSI Roadmap 2019+

This document is based on the previous version of the DSI Roadmap and contains formal explanations of the structure and areas of focus of the UZH Digital Society Initiative (DSI). It summarizes the DSI's vision for the future. The Roadmap is updated every two years.

Version as of October 2019

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## 1 Introduction

### 1.1 Background

Digitalization challenges existing paradigms, enables new forms of research and teaching, and requires new skills in a rapidly changing social reality. The goal of the UZH Digital Society Initiative (DSI) is to critically reflect on the digitalization of society, democracy, health, academia, communication and the economy, and to shape the process in a future-oriented manner. The DSI also aims to position UZH at the national and international level as a center of excellence for critically reflecting on all aspects of our digital society.

The DSI evolved as a bottom-up initiative and was developed by a working group of UZH professors from all seven of the University's faculties. After the original concept was drafted, the DSI was

launched in an official ceremony in September 2016 in the presence of Silvia Steiner, the Director of the Department of Education of the Canton of Zurich, and Johann Schneider-Ammann, the President of the Swiss Confederation.

The first year was mainly spent focusing on establishing the formal aspects of the initiative. In the second year, the DSI concentrated its efforts on building up its structures. During this phase, the DSI defined its rules of procedure, organizational structure and areas of focus in a bottom-up process and set up the organization's various governing bodies. This phase saw the growth of the DSI network to more than 180 UZH researchers (in October 2017). The DSI was finally officially established by the Executive Board of the University on 17 May 2017.

Since 1 August 2018, the DSI has been part of the Office of the Vice President Faculty Affairs and Scientific Information and is a faculty-independent, cross-faculty unit. Representatives of all seven faculties of the University and of the Executive Board sit on the DSI Steering Committee. There are currently over 330 UZH researchers taking part in the DSI (in April 2019).

With the DSI entering its third year, the focus of the initiative will increasingly turn to tackling questions of digitalization in society through reflection and research, with interdisciplinary and inter-faculty structures and projects being of central importance. The aim is to create new synergies within the University. The DSI is not part of any faculty, and this independence allows the initiative to drive forward innovative projects in a flexible manner.

## 1.2 Mission Statement & Vision

**Mission statement:** Digitalization is fundamentally changing academia and society at an increasingly rapid pace. This process challenges existing paradigms, opens up new approaches for research and teaching, and demands new skills in a rapidly changing social reality. It is the duty of all academic disciplines and society as a whole to critically reflect on and shape these developments.

**Vision:** The UZH Digital Society Initiative provides an independent academic platform at UZH for promoting critical, interdisciplinary reflection and innovation regarding all aspects of the digitalization of society and academia.

## 1.3 Main Goals

The DSI was established to address the rapid process of digitalization that is fundamentally changing society, academia and the economy. The main goal of the DSI is to critically reflect on and shape this process in a forward-looking manner, thereby positioning UZH as a center of excellence for digitalization issues at the national and international level. The DSI aims to:

- further develop and expand skills in disciplines that are particularly impacted by digitalization – namely in data-intensive disciplines and methods – at the highest international level;
- make full use of the innovative potential of digital methods and technologies and systematically support knowledge and technology transfer at the University;
- recruit and support junior researchers who use an interdisciplinary approach to focus on the societal impact of digital change;

- debate and propose appropriate regulations and framework conditions for our digital future in partnership with policymakers and business leaders;
- work together with various stakeholders to develop broad-based potential future scenarios for what a “digital Zurich” – and beyond – might look like in the future;
- establish UZH as a leading independent hub of expertise for issues of digital change on both a national and international level.

To achieve these goals, the DSI has grouped its activities into four initiatives that address the challenges of digitalization. Research, teaching and outreach activities should therefore be implemented in each of the following areas:

- **Skills Initiative – key qualifications for a digital society:** Over the next decade, professorships in disciplines that are particularly impacted by digitalization will be established, namely in data-intensive disciplines and for new data-intensive research and teaching methods. Professors should aim at developing research and teaching in an interdisciplinary way and equipping current and future decision-makers from all fields with the key qualifications that they will need in order to succeed in a digital society.
- **Innovation Initiative – practical uses for digital technologies:** The DSI will establish research groups that focus on the interdisciplinary use of new digital methods. In doing so, UZH will make full use of its potential to develop highly practical, future-oriented ideas for business and society and to develop novel ways to support the transfer of knowledge and technology.
- **Regulation Initiative – creating legal framework conditions:** The DSI will establish interdisciplinary working groups that will work together with interested stakeholders from politics, business and civil society to evaluate existing and planned regulations with regard to their feasibility in a digital society. The aim is to support policymakers and society in creating appropriate framework conditions for digital change.
- **Future Initiative – potential scenarios for society:** The DSI aims to create the capacity for reflection across disciplines – both internally and in dialogue with citizens as well as representatives from politics, business and administrative bodies. The DSI shares research findings with the community, be it through outreach activities, open-access publications or open online courses. The aim is to use scientifically confirmed findings to develop potential future scenarios that are ethical and offer the maximum benefits for society as a whole.

## 2 Structure of the Digital Society Initiative

### 2.1 Terminology

There are different groupings, structures and topics within the DSI:

- **DSI challenge areas** are clusters of research topics in different areas in which digitalization poses societal challenges. The number of challenge areas has been capped at five in order to prioritize research in these areas. The challenge areas have been broadly defined in order to enable research into diverse issues.

- **DSI cross-cutting topics** concern methodological issues as well as topics that are of relevance to all challenge areas. These topics can be explored through professorships or other types of institutions (e.g. “labs” led by senior researchers). In order to ensure interaction with the other DSI structures and groups, cross-cutting topics need to offer some kind of benefit for other researchers (e.g. technical expertise, access to data, etc.). The number of cross-cutting topics is flexible and should be responsive to the methodological needs of the DSI.
- **DSI communities** are organized groups of DSI researchers working together on a specific challenge area or cross-cutting topic. There are currently six communities: communication (since 2017, 70 members), ethics (since 2019, 28 members), democracy (since 2017, 25 members), health (since 2017, 35 members), mobility (since 2019, 20 members), and work (since 2019, 15 members).
- **DSI research topics** come from suggestions from DSI members for research questions that may be relevant for the DSI. The DSI regularly collects these ideas, which may be eligible to receive seed funding.
- **DSI structures** refer to the structures within the DSI as a whole in which specific research topics can be explored.

## 2.2 Structures

There are ten types of structures within the DSI for exploring DSI topics:

- **DSI professorships** in disciplines relevant to the DSI are included in the development and financial plan and guarantee the capacity for independent reflection and research. The DSI also supports the faculties in positioning new professorships that are related to the DSI’s general goals. New professorships are connected to individual areas of activity and/or cross-cutting topics at the DSI. Eight DSI professorships are currently filled, with more being planned as part of the Zurich Universities Digitalization Initiative (ZUDI): An additional five DSI professorships along with three to four inter-institutional “bridge professorships”. UZH is cooperating with three other Zurich higher education institutions (ZHAW, ZHdK and PHZH) for the initiative. The goal of these new professorships is to develop the new areas of research brought about by digitalization.
- **DSI assistant professorships** in disciplines relevant to the DSI are established on the basis of agreements between the DSI and the faculties at UZH. This program currently consists of ten professorships, with an additional ten being planned as part of the ZUDI. These assistant professorships, which are partially funded by the DSI, aim to anticipate and develop new research topics in the area of digitalization and to create the capacity for independent research and reflection.
- **Independent, interdisciplinary DSI research groups** address individual challenge areas and/or cross-cutting topics within the DSI. These groups are partially financed by third parties. Young academics should also be given the chance to lead research groups. The DSI aims to establish the first research groups within the next two years.
- **DSI labs** are networks of UZH researchers who are seeking closer cooperation (e.g. joint research projects). The DSI provides various kinds of financial support to these labs (seed funding, etc.). There are currently three labs: the Digital Democracy Lab, the Digital Ethics Lab and the Digital History Lab.
- **DSI teaching programs** are currently being developed on the BSc/MSc and PhD levels. They comprise courses that help students develop their digital skills and the ability to reflect critically

on digital change. The aim is to implement the first pilot courses at BSc level in the Fall Semester 2019 and to launch the PhD program in 2020.

- ***DSI partnerships*** are formal agreements between the DSI and other institutions (within UZH and external). There are currently four agreements in place with the following institutions: the Citizen Science Center, the Center for Information Technology, Society and Law (ITSL), the Swiss Data & Service Alliance and the Blockchain Center. The DSI aims to enter into agreements with other universities wherever possible. The Zurich Universities Digitalization Initiative is a highly promising concept that offers a framework for working together with other higher education institutions in Canton Zurich.
- ***DSI academy fellows*** are either UZH researchers or invited external fellows who are associated with specific DSI research themes for a limited time.
- The ***DSI managing office*** supports the Board of Directors and DSI members with their activities and with obtaining external funding. The office coordinates DSI activities, organizes events and acts as a point of contact for questions from the private sector, politics, culture and civil society.
- ***DSI science support services*** are provided by the DSI managing office to all academics who are DSI members. Conditions for membership are set out in the rules of procedure. Science support services facilitate access to other services and/or expertise from DSI's cross-cutting topics.
- ***DSI informatics support*** will be made available in the future in cooperation with S3IT (Service and Support for Science IT). Regularly scheduled data clinics will give DSI members support when it comes to handling, evaluating and analyzing their data.

## 2.3 Areas of Focus

### 2.3.1 DSI Roadmap 2017

At the beginning of 2017, the DSI defined its areas of focus together with representatives of the DSI network (see Figure 1).

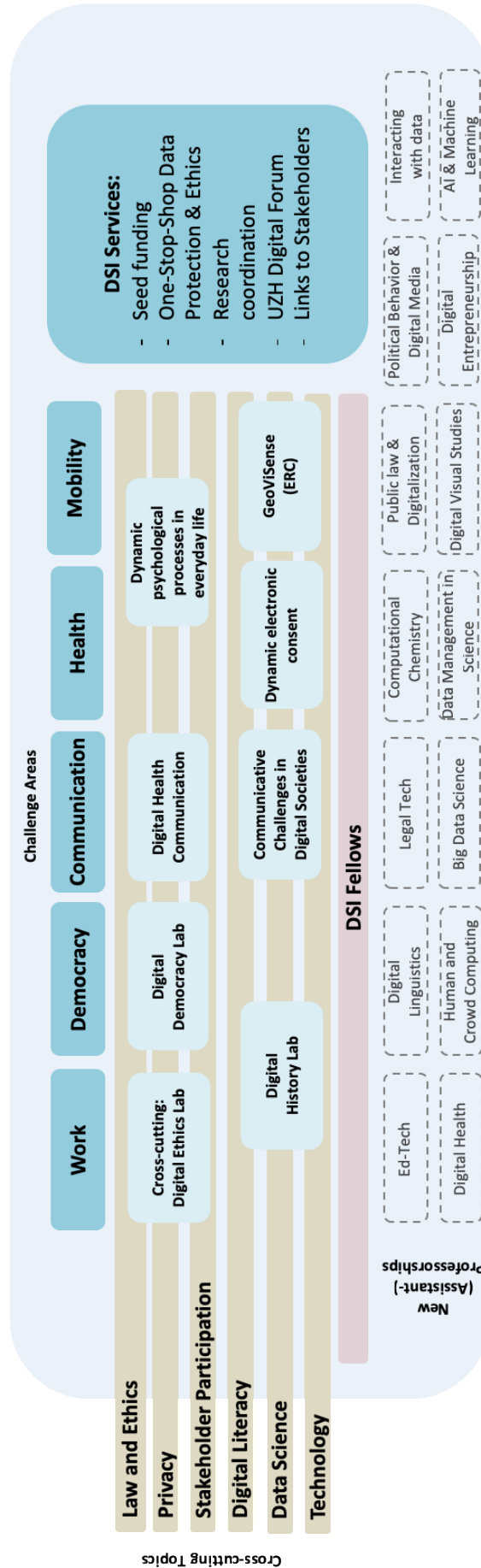


Figure 1: Structural elements of the DSI (in 2017).

### 2.3.2 DSI Roadmap 2019+

In March 2019, the DSI asked its 330 members to submit their ideas for research topics with the aim of ensuring that the DSI's areas of focus were in line with current needs. This led to the creation of five challenge areas: communication, democracy, health, mobility, and work; and six cross-cutting topics: data science, digital literacy, ethics, law & privacy, participation & stakeholder involvement, and technology. All initiatives, projects, structures and DSI professorships stand at the intersection of these challenge areas and cross-cutting topics.

- **Challenge areas:** Following in-depth discussions, the following five challenge areas have been agreed upon by the DSI's members:
  - **Communication:** Research related to the impact of digitalization on human social interaction through various media.
  - **Democracy:** Research related to the impact of digitalization on the political system, democracy and related topics.
  - **Health:** Research related to digital changes in health care; digital tools for understanding and treating diseases and improving health.
  - **Mobility:** Research related to the impact of digitalization on mobility, smart cities, and related topics such as sustainability.
  - **Work:** Research related to the impact of digitalization on the economy, innovation and work, and the associated societal changes.

Challenge area topics are meant to be broad enough to allow for maximum flexibility in obtaining support from decision-makers for new positions, research groups, etc.

- **Cross-cutting topics:** Some additional suggestions were made with respect to cross-cutting topics. We have grouped them into the following themes:
  - **Data science:** Developing skills in big-data management, processing, analytics and visualization.
  - **Digital literacy:** Setting up new teaching programs (digitalization for the general studies module) and continuing education programs.
  - **Ethics:** Empirical and normative research on ethical questions; providing ethics expertise to internal and external stakeholders.
  - **Law & privacy:** Research on regulatory framework conditions and data protection issues.
  - **Stakeholder participation:** Stakeholder inclusion, with particular emphasis on representatives from civil society. Also: knowledge and technology transfer, promoting startups and innovation.
  - **Technology:** Developing new digital methodologies and technological devices (apps, sensors, etc.) that are indispensable for digital research.
- **DSI Topics 2019+**
  - DSI professorships are exploring the following topics: educational technology, digital linguistics, legal tech, computer-aided sciences, digital chemistry, digital and mobile health, human and crowd computing, machine learning in precision medicine, and big data science. Further areas to be pursued are: digital (mental) health, computational health science, computational social science, digital literary studies, digital visual studies, digital

- religions, dynamic system analytics, digital creativity, computational modeling of the mind and brain, and digital edition analytics.
- DSI-supported assistant professorships are exploring the following topics: public and health law & digitalization, digital visual studies, political behavior and digital media, digitized communication spaces, managing digital transformation, interacting with data, AI & machine learning, digital geographies, and digital ethics (professorship ad personam). Additional need exists in these areas: historic software emulation, digital endpoint design, technical aspects of legal tech, and analytical/semantic computing.
  - Labs have been started to explore the topics of digital democracy, digital ethics and digital history. There is additional need in areas such as research infrastructure for digital linguistics, contextualized adaptive health communications and interventions, and digital scientific collections analytics.
  - The DSI has entered into partnerships with centers of excellence at UZH and national organizations to explore the topics of participatory citizen science, information technology, society and law, data & service, and blockchain technologies. There is potential to expand these partnerships.

Further topics that could be explored via a variety of DSI organizational structures are listed in Appendix B1.

## 2.4 Science Support Services

The services provided by the DSI managing office include the following:

- **Grant application support:** Supporting researchers in writing successful grant proposals related to digitalization topics and in managing research projects.
- **Ethics management:** Creating guidelines and evaluation systems that deal with the specific ethical challenges posed by digital research (e.g. data acquisition and management). The DSI and UZH Legal Services (data protection) have been working together to launch the “One Stop Shop Data Protection & Ethics” project, the aim of which is to create a single point of contact for UZH researchers to find solutions to ethical and data protection questions that arise in connection with their projects.
- **Research coordination:** Managing processes that facilitate the cooperation of DSI research groups (coordinating research groups, organizing internal colloquia, etc.).
- **Event organization:** Supporting DSI researchers in organizing workshops, conferences, and other types of events. This includes the DSI Data Day and workshops organized by the DSI communities.
- **Contact point for stakeholders:** Acting as a bridge between academia and journalists, businesses, policymakers and public administration bodies.
- **Programming & analytics:** Support provided by S3IT (S3IT supports UZH researchers and research groups in using IT to strengthen their research, including consultancy, application support and access to cutting-edge cloud, cluster and supercomputing systems). Systems for participant access and online research data management (SIRON project: Swiss Infrastructure for Responsible Online Research) are currently being evaluated.



## 2.5 Funding Priorities

The following points have been agreed upon with regard to the use of DSI funds:

- **Strategic matching funds:** DSI funds can be used to increase the success of ongoing projects (e.g. by increasing the employment percentage of personnel) or to fund projects that cannot be carried out without a budget increase.
- **Strategic investments:** DSI funds can be used to launch initiatives with high probability of success (e.g. for obtaining third-party funding).
- **Strategic outreach activities:** DSI funds can be used to support workshops organized by DSI researchers. In return, the DSI can reap benefits such as getting a prestigious speaker for a public event or enjoying publicity from sponsoring an event.
- **Strategic community support:** The DSI managing office ensures that DSI communities have the necessary resources to function. This includes the establishment of DSI community meetings and working spaces. Another element of this priority involves providing DSI communities with the resources they need to remain viable. Furthermore, a project development position is being created to provide project management support to academic projects and to develop future-oriented projects within UZH.

The DSI has set criteria that strategic projects must fulfill in order to be eligible for funding. The criteria can be found on the DSI website.

## 3 Current and Future Activities

Various activities were undertaken both inside and outside of the DSI in 2018 – the second year of the initiative's existence. The main achievements are listed below.

### 3.1 Office Space

Members of the DSI network also emphasized the need for DSI facilities for research teams, meetings, workshops, events and administration. After major delays, the current schedule foresees that the DSI will move into its new office space by the end of 2019.

### 3.2 Website

The UZH Digital Society Initiative website was relaunched in November 2018. The site was reorganized and now provides a clearer overview of the initiative's activities, news and purpose.

### 3.3 Communications Concept

After its founding in September 2016, the DSI enjoyed a positive reception within UZH and now counts over 300 researchers as part of its network. The time has come to reinforce awareness of the DSI within the UZH community, give it visibility in the eyes of the public and raise its profile through communication measures. To this end a new communications concept was created in early 2019. The main target groups are the general public and the business community (external) and professors and young researchers within the university (internal).

### 3.4 Successes

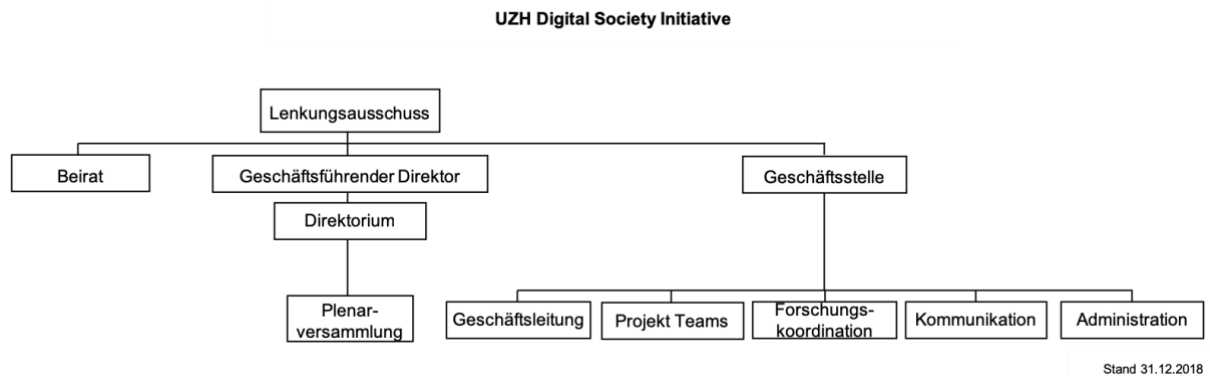
Various research and outreach activities have taken place since September 2016:

- **DSI network:** The DSI network has grown to more than 330 people, most of whom are UZH professors. Since its first plenary meeting in October 2017, the DSI network has also accepted associated members, i.e. members without a UZH affiliation.
- **DSI events:** The DSI has organized a series of internal and external events. The internal events mainly contributed to the formalization of the DSI. Network members and UZH deans contributed to the drafting of the different documents and content ideas for the DSI. Additionally, the first DSI Data Day took place in July 2018. This half-day event focused on sharing tips and guidelines for professionally handling data of all kinds. Topics included data management, technical support and ethical/data protection issues. The event was jointly organized by S3IT, the new Data Service Center and the DSI and marked the first-ever Code and Data Clinic, where researchers can periodically discuss their data-related questions with experts. External events included public events that were part of the UZH Digital Forum as well as contributions to Digital Day, Digital Festival, Scientifica and the 100 Ways of Thinking science festival.
- **Media reception:** The DSI and its projects received positive coverage in around 100 media reports from September 2016 to April 2019.
- **DSI successfully raising third-party funds:** The DSI supports researchers in obtaining external funding. One example is funding from the Swiss Network of International Studies for a two-year project on opportunities and challenges with regard to the ethical use of drones for humanitarian purposes. A DSI seed grant was used to support the grant application. The DSI is also coordinating two cross-cutting activities related to NRP 75 “Big Data.” The first activity is the ELSI task force, which is responsible for providing expertise on ethical, legal and social issues for all projects within NRP 75. If researchers encounter issues in these areas in the course of their work but do not have the field-specific knowledge and resources to tackle them, they can turn to the ELSI task force for expert advice. This project is coordinated by the DSI and covers all Module 2 projects within the National Research Program. The second activity is Women in Big Data, an initiative that specifically seeks to promote female researchers in the data sciences and to promote discussion on this topic.
- **Support for large projects:** The DSI actively supports its network members in applying for NCCRs and URPPs. One of the NCCRs supported by the DSI is still in the running, and several of the URPPs have entered the second selection round.
- **Projects supported by DSI:** The DSI supports its members’ projects with DSI strategic funds. The types of activities supported include workshops, conferences, digitizing of corpora, web portals to support academic work, apps, publications and consortia for H2020 grant applications.
- **DSI Digital Ethics Lab:** Initiated by PD Dr. Markus Christen, members of the DSI are consolidating several ongoing research projects that specifically address the ethical issues of digitalization (including the CANVAS project) into the DSI Digital Ethics Lab. A DSI research project (the first to be run directly under the DSI) on human-machine interaction in ethical decision-making has been ongoing since 2017. The DSI-DEL was officially established by the DSI Board of Directors in January 2019.
- **Inside IT:** Researchers have been contributing to the online magazine Inside IT since September 2017. So far seven articles on different research topics have been published in the magazine’s “DSI Insights” section.



## Appendix A

### A.1 Organization Chart



Key for Org Chart:

Lenkungsausschuss = Steering Committee

Beirat = Advisory Board

Geschäftsführender Direktor = Managing Director

Geschäftsstelle = Head Office

Direktorium = Board of Directors

Plenarversammlung = Plenary Assembly

Geschäftsleitung = Management Team

Projekt Teams = Project Teams

Forschungskoordination = Research Coordination

Kommunikation = Communications

Administration = Administration

During the DSI's one-year pilot phase, the initiative employed four directors and support staff consisting of a managing director and an academic associate. As the number of the DSI's activities grew, it became necessary to increase staff numbers. The following positions have been added: a fifth director, a co-managing director, a communications specialist and an administrative assistant. This structure allows the DSI to support both the Board of Directors and the members of the DSI network with upcoming research activities.

An office for academic project management and organizational development is currently being developed. The goal is to hire academic project managers who can work flexibly on different projects. Potential tasks include creating and/or implementing structures and projects for the university or academia. Additionally, two coordinators have been hired, one for the *studium digitale* (digital general studies) module and one for the digital skills PhD program.

Additional personnel have been recruited on a part-time basis for specific DSI projects: an ethicist and a data protection expert for the "One Stop Shop Data Protection & Ethics" project and one researcher for the further development of the SIRON project.

The final governing body of the DSI was established in June 2018: the DSI Advisory Board. Ten representatives from the spheres of politics, business, academia and culture sit on the board and

support the DSI with their expertise, experience and networks, thereby helping the initiative enjoy continued success.

## B.1 Research Topics

In March 2019, the DSI asked its 330 members to submit their ideas for research topics. These ideas have been numbered and grouped together in Figure 2 below.

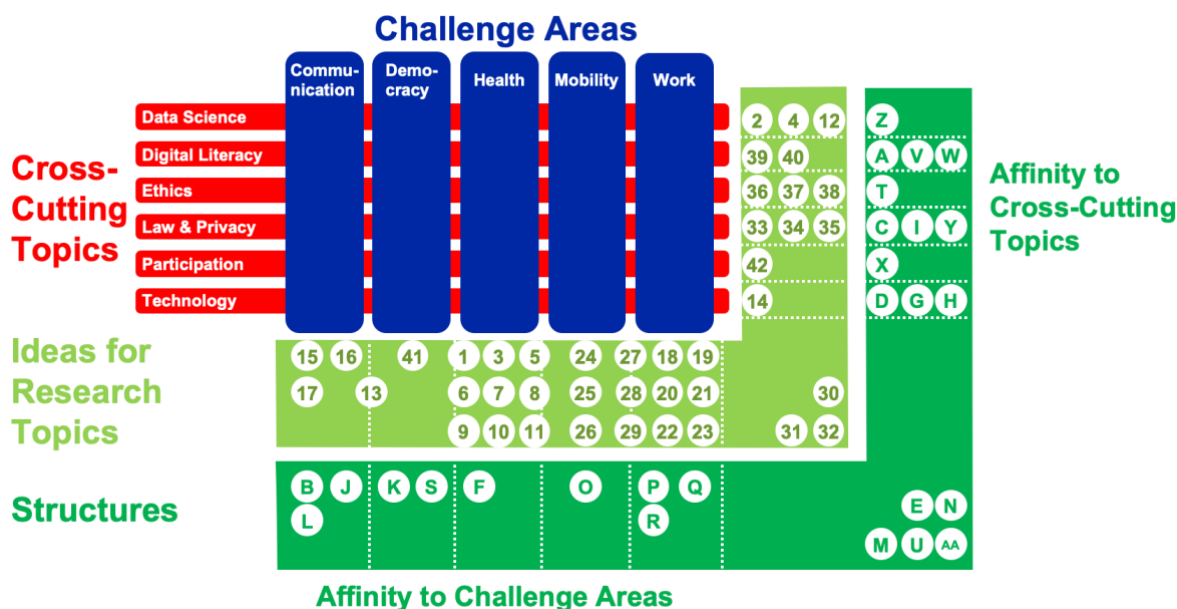


Figure 2: Challenge areas, cross-cutting topics, research ideas and DSI structures in 2019.

### List of ideas for DSI Topics

#### Digital health

1. Digital health communication lab
2. Computational health science/ semantic health activity analytics/ computational health activity analytics
3. Physiological assessments with the Ava sensor bracelet in women during different stages
4. Predicting future health outcomes from messy laboratory and real-world data
5. Computational modeling of the mind and brain
6. Big-data dynamic systems modeling
7. The digital body: Potentials and risks of altered embodiment in the digital society

#### Digital mental health

8. Digital behavior change and health promotion
9. Digital interventions for emotional disorders
10. Towards machine-based scoring of neuropsychological screening tests

#### Digital humanities

12. Historic software emulation
13. Indigenous AI
14. The digital future of the University of Zurich Scientific Collections and Museums

#### Communication

15. Digital voices: chances and risks in future human-computer interaction
16. Digital media use and its impact on adolescents' and young adults' lives
17. Shifting from spoken to written communication – perspectives for perception, cognition, social isolation and mental health

#### Future of work

18. People analytics

- 19. Management with AI
- 20. Digital ethics & corporate social responsibility in the digital age
- 21. Immersive computing
- 22. Data-intensive organizations
- 23. Design science

#### **Future of mobility**

- 24. Dynamic system analytics
- 25. Cyber-physical systems
- 26. Ultra-large long-lived systems design, development and management

#### **Future of mobility and work**

- 27. Collective intelligence
- 28. Internet of things
- 29. Analytical computing

#### **Digital individuality**

- 30. Digital individuality
- 31. Trust allocation
- 32. Digital social influence

#### **Law and ethics**

- 33. DLT and the law
- 34. Creating an integrative framework for solving ethical and legal dilemmas in cybersecurity
- 35. Meaningful human control of security systems – aligning humanitarian law with human psychology
- 36. Value-sensitive humanitarian innovation
- 37. Socially acceptable AI and fairness trade-offs in predictive analytics
- 38. Serious moral game development

#### **Digital literacy**

- 39. Management of lifelong learning
- 40. Learning design thinking for technology-enhanced learning in higher education (think4tel)

#### **Digital democracy**

- 41. Digitalization monitor

#### **Stakeholder participation**

- 42. Citizen science as a tool for multi-area research and stakeholder engagement

### **List of existing DSI Structures**

#### **DSI professorships**

- A. Educational Technology
- B. Digital Linguistics
- C. Legal Tech
- D. Computational Science
- E. Digital Chemistry
- F. Digital and Mobile Health
- G. Human and Crowd Computing
- H. Big-Data Science

#### **DSI assistant professorships**

- I. Public and Health Law & Digitalization
- J. Digital Visual Studies
- K. Political Behavior and Digital Media
- L. Digital Communication Spaces
- M. TBD (Faculty of Medicine)
- N. TBD (Faculty of Science)
- O. TBD (Faculty of Science)
- P. Managing Digital Transformation
- Q. Interacting with Data

R. AI & Machine Learning

**DSI labs**

S. Digital Democracy Lab

T. Digital Ethics Lab

U. Digital History Lab

**DSI teaching programs**

V. *Studium Digitale* (general digital studies) module

W. PhD Digital Skills Program

**DSI collaborations**

X. Citizen Science Center

Y. ITSL (Center for Information Technology, Society, and Law)

Z. Data & Service Alliance

AA. Blockchain Center

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