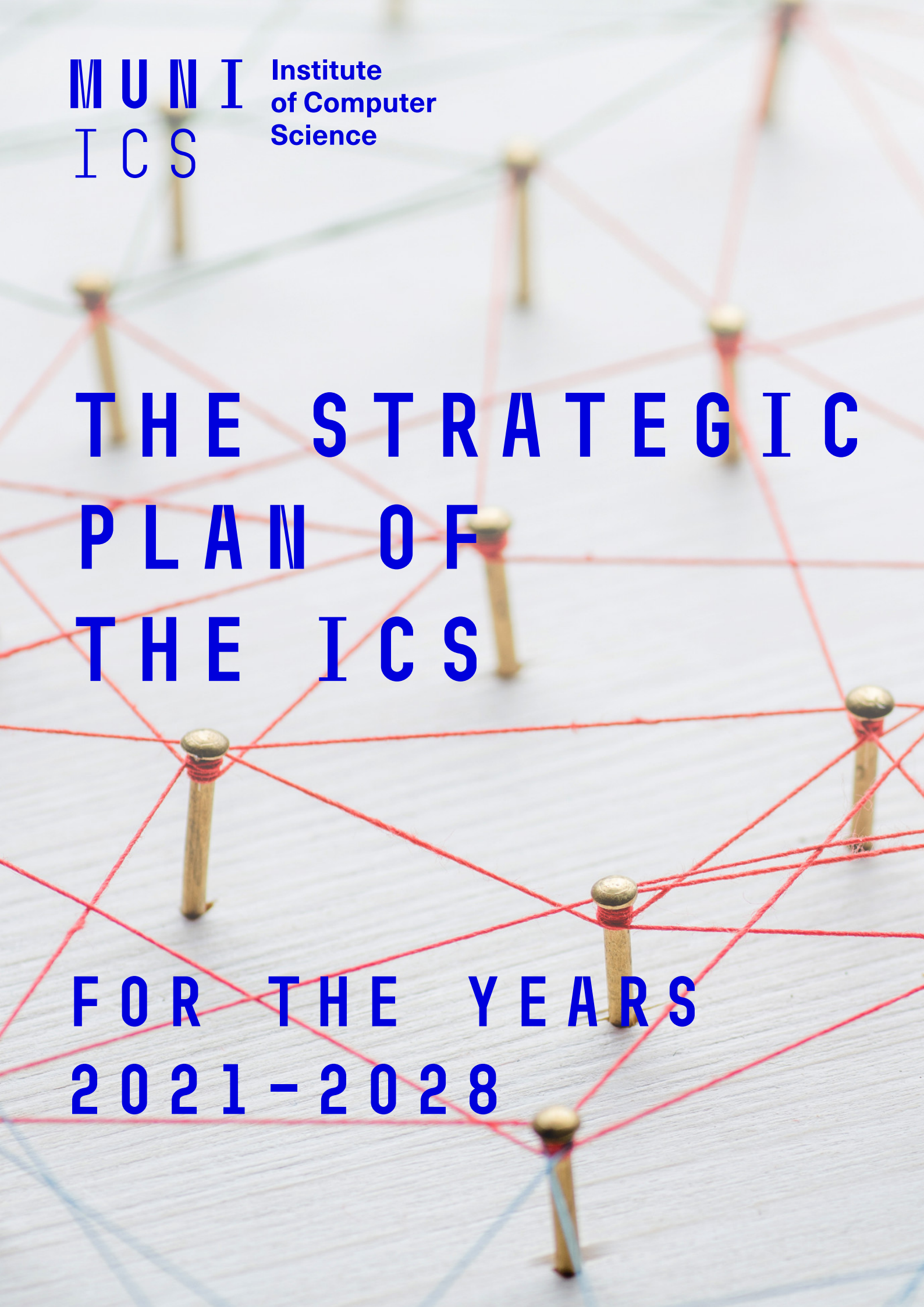
MUNI ICS

Institute of Computer Science



THE STRATEGIC PLAN OF THE ICS

FOR THE YEARS 2021–2028

MUNI ICS Institute of Computer Science

The Strategic Plan of the ICS for the Years 2021–2028

FOREWORD

The ICS Strategic Plan is based on the Masaryk University Strategic Plan, and in several areas, implicitly takes over the goals and priorities without their explicit mention in this document. In contrast to the MU Strategic Plan, the ICS's Strategic Plan is significantly more specific and comprehensive at the level of the strategic objectives; on the contrary, the measures are usually shorter. The Institute thus reflects the situation in the field of information technologies and their deployment, when it is necessary to count on the rapid change of specific technologies and the way they are deployed; therefore, it usually does not make sense for long-term plans to go into too specific (technological) measures, as these will undoubtedly change.

Therefore, despite the still relatively high degree of abstraction used, it is necessary to consider that significant changes will occur, especially in IT professional background, and the ICS Strategic Plan will need to be modified accordingly.

On the other hand, the ICS Strategic Plan (in the context of the MU Strategic Plan) is a clear plan of further development of ICS MU with the target of maintaining and further strengthening its role as a top workplace, providing expert professional IT background to the university and gradually create an internationally visible and recognized workplace in strategic areas of research and development, explicitly described in this document. At the same time, ICS wants to hold the role of a key partner in cybersecurity, building EOSC and Open Science environment within the Czech Republic and the EU.

OUR VISION

BY 2028, THE MU INSTITUTE OF COMPUTER SCIENCE WILL BE:

1. An internationally open workplace supporting applied research in selected strategic areas with the simultaneous deployment of results in the operation and management of the university IT infrastructure and related services.

2. An important and active part of the extensive research infrastructure e–INFRA CZ, with specific responsibilities for fulfilling the EOSC principles and their implementation at the national level.

3. A key national institution of Open Science activities in the Czech Republic, purposefully supporting preparation and access to scientific data following FAIR principles.

4. ICS will actively contribute to the perception of Open Science as an ecosystem of service providing professional scientific services for academics and serve at the same time as the advanced infrastructure for fulfilling the university's social role.

5. A National Research Center in the field of validation and explainability of artificial intelligence methods, including the application of results in selected strategic areas.

6. A top cybersecurity center exploring the possibilities of automation of cybersecurity teams and developing the use of artificial intelligence for the creation of autonomous cybersecurity systems.

7. A dynamic provider of top IT infrastructure facilities and a comprehensive portfolio of quality IT services, bringing added value to employees, teams, students, and visitors of Masaryk University.

8. A leader in the field of information systems and electronic agendas of universities using artificial intelligence methods to support the management of universities.

1 TEACHING AND EDUCATION

STRATEGIC PRIORITIES

1.1 ICS will become an essential part of the MU educational environment, focusing on IT professional education, advanced data management, and education in cybersecurity.

KEY RESULTS AND INDICATORS

1.I ICS is perceived as the expert workplace actively sharing its experience.

1.II ICS offers lectures, individual courses, and larger educational blocks within the university and external interested parties or institutions.

1.III ICS provides students with internships and opportunities for active involvement in developing and administering the ICT infrastructure and data in research in strategic areas, including participation in the preparation of policies and background for Open Science.

1.IV ICS employees conduct Bachelor's and Master's theses, mainly, but not exclusively, for students of the Faculty of Informatics (the widest possible coverage of research and IT professional areas).

1.V ICS offers and expands specific IT education for the public, public and private sectors, focusing on cybersecurity, IT infrastructure, and core IT and scientific services.

TOOLS FOR ACHIEVING STRATEGIC OBJECTIVES

1.A ICS will become the guarantor of the IT part of the core university courses and will take care of the digital competencies of students, MU staff, and participants in lifelong learning courses in cooperation with other parts of MU.

1.B ICS will cooperate more closely in teaching digital competencies with the private sector and other non-academic institutions.

1.C Continuous communication with study program guarantors, specifically in professional IT specialization, regarding the possibilities of internships, final thesis topics, and cooperation on specific lectures or parts thereof.

1.D Targeted support of modern approaches in teaching over the top infrastructure and providing appropriate facilities and services, including support of various forms of distance learning (digital simulation, virtual experiments, etc.).

2 SCIENCE AND RESEARCH AND DOCTORAL STUDIES

STRATEGIC PRIORITIES

2.1 Contribute to the position of MU as a top research university by developing its e-infrastructure background, based on active involvement in national and international e-infrastructures, in particular e–INFRA CZ and EOSC; to promote interdisciplinarity through active involvement and cooperation with other research infrastructures at MU and beyond.

2.2 Coordinate and systematically develop the principles and strategy of Open Science at MU, establish MU as a significant bearer of large research data repositories, built in compliance with FAIR principles and involved in the EOSC ecosystem in order to promote the long-term improvement of the decision-making culture based on (scientific) facts in the Czech Republic (development of scientific diplomacy).

2.3 Continuously develop the position of ICS as an internationally recognized workplace of applied research, especially in the strategic areas of cybersecurity, artificial intelligence, and e-infrastructures, with targeted use of the results achieved directly in the university environment.

2.4 Support IT-oriented interdisciplinarity in doctoral studies, offer appropriate dissertations topics and collaborate across doctoral degree programs at the university by qualified care of the synergistic application of IT principles in solving interdisciplinary research topics related to the ICS's strategic research directions.

SPECIFIC STRATEGIC PRIORITIES IN INDIVIDUAL STRATEGIC AREAS OF ICS RESEARCH

2.5 Be the leading national workplace in the field of research and application of autonomous cybersecurity tools, with a particular focus on the tools and processes that enable to master the transformative influence of artificial intelligence on cybersecurity.

2.6 Develop the concept of maximum automation of the cybersecurity team, whose focus is to research advanced methods of ensuring situational awareness and prediction of cybersecurity incidents.

2.7 Study and develop models, tools and processes for validation, verification and deposition of AI methods in order to become a national reference institution in this field, in particular for the processing of cybersecurity data, life sciences and medicine and the operation of large-scale IT systems.

2.8 Develop research in the field of explicability of the behavior of artificial intelligence methods with subsequent development of applied XAI (explainable AI) methods, to achieving the position of a national leader in this field.

2.9 Create a flexible (cloud) infrastructure for data extraction from scientific data repositories in particular in the following areas: (i) health and life sciences, (ii) environmental, toxicological and pharmaceutical data, (iii) operation of e-infrastructures, including data specific to cybersecurity research; in connection with point 8 then actively contribute to the building of data repositories in these areas.

2.10 Develop research and progress in designing and accelerating algorithms for efficient use of high-performance (HPC) e-infrastructures and large data warehouses. Support and develop interdisciplinary research by targeting the MU research teams' needs in national and international contexts, especially in large research infrastructures, the EOSC and EuroHPC; playing a key role in this area within the national e-infrastructure e–INFRA CZ.

2.11 Develop research in the field of access control to IT resources (authentication and authorization infrastructure), including the development of appropriate tools with an aspiration for broad international deployment.

2.12 Develop the Open / FAIR Data concept, especially in relation to methods, processes and tools for creation, operation and further development of open repositories of scientific data; involving actively (in coordination) in the preparation of the national concept and the subsequent building of a network of such repositories within the Czech Republic and their connection to international activities.

KEY RESULTS AND INDICATORS

Common

2.I High quality of publication results, especially in D1 and Q1v journals and at top conferences; a growing trend in the number and quality of results.

2.II Significant share of publications with foreign partners (a growing trend).

2.III Increase the number of habilitated employees (associate professors and professors) so that at least two habilitated workers cover each strategic topic.

2.IV Extent of involvement in international authorities (working groups, panels, standardization institutions and groups...), specifically in the position of leaders or their deputies.

2.V Growing involvement in international projects and similar activities with a significant position in the project framework; coordination of international projects (measured by a number of projects, position in them, and volume of funds raised).

2.VI Number of successful doctoral graduates led by ICS employees; a number of supervisors–consultants from among ICS employees (regardless of the field of study); a growing trend in the leadership of doctoral students under dual supervision (with a foreign institution).

2.VII Number of cooperating foreign workplaces (the primary indicator are exchange stays for trained doctoral students and employees).

2.VIII Number of cooperating industrial partners (a growing trend) and development of contract projects research (national and international).

2.IX Number of active cooperation with the state administration or self-government (projects, studies, contract research...).

Specific

2.X Number of large research infrastructures with active (contractual) cooperation with ICS.

2.XI Number and extent of managed repositories of scientific data.

2.XII Create the framework for the development and continuous training of autonomous cybersecurity tools.

2.XIII Create the system and methodology for system validation using the principles of artificial intelligence.

TOOLS FOR ACHIEVING STRATEGIC OBJECTIVES

2.A Emphasize increasing academic qualification — professional guidance of doctoral students in consultants' role, securing habilitated employees, and preparing for securing at least one professorship position.

2.B Continuing the internationalization of team members, recruitment, and ongoing maintenance of foreign workers in post-doc positions.

2.C Deepening cooperation with existing foreign partners — extensive involvement in international research communities through joint projects, working groups, organization of conferences and exchanges; specifically deepening cooperation and involvement in European and possibly in global infrastructures.

2.D Deepening cooperation with the state administration and the commercial sector — continuing and developing existing cooperation, finding opportunities to create new ones, ensuring the transfer of research and development results into practice, obtaining continuous feedback and initiative for research and development topics.

2.E Submitting projects with significant research or development potential and applied outputs commercialization.

2.F Establishing cooperation with hospitals in the Czech Republic to store medical data for Research (in progress with FN Brno and MOU).

2.G Developing collaboration with RECETOX.

2.H Offering post-doc positions in AI analysis of multimodal health data (with more precise specification sub-domains — e.g., omic and clinical data, imaging and clinical data, time series).

2.I Applying research prototypes to clinical practice in cooperation with medical groups or with industry — with appropriate national and international funding.

2.J Involving in the creation of European Health Data Spaces at the national level.

2.K Targeted interaction with other significant research infrastructures in the field of life sciences and environmental protection at both national and international level; searching for potential in particular project collaboration within Horizon Europe.

2.L Active role in the university strategy of renewal and development of research infrastructures; active role at the national level in further developing research infrastructures and especially their IT background.

2.M Direct support for the ICS involvement in other research infrastructures, especially in coordination with other MU workplaces.

2.N Specific involvement in university-wide support of interdisciplinary teams requiring significant IT support or resources.

2.O Implementing the Open Science Strategy MUNI 2022–2028.

3 INTERNAL CULTURE AND SOCIAL ACTIVITIES

STRATEGIC PRIORITIES

3.1 Active offer of professional expertise in IT areas, emphasizing cybersecurity and safe use of AI tools.

3.2 ICS will become a partner to increase the professional expertise availability of university for the general public, including its comprehensible presentation.

3.3 Support students and university staff's altruistic initiatives in the form of creation and operation appropriate IT platforms and tools; ensure the long-term operation of at least one university platform for social discussion.

KEY RESULTS AND INDICATORS

3.I ICS moderates the discussion within the professional university IT community and supports its mutual knowledge with users; contributes positively to the cultivation of this relationship.

3.II ICS applies research procedures obtained from working with data and experience with user processing requirements for the comprehensible presentation of key information on societal issues.

3.III CPS is gradually transformed into a meeting place for students and an environment that allows, in collaboration with libraries, to act as an open public platform to communicate social issues and evaluate their response.

TOOLS FOR ACHIEVING STRATEGIC OBJECTIVES

3.A Creating a communication strategy and a strategy for the popularization of science and professional IT expertise of ICS, including public and social media, including local ones.

3.B Deepening communication within the IT community, organization of educational workshops, quality care of services provided, communication of community topics, and professional identity to the university public.

3.C Emphasizing intra-university publicity of activities in the field of IT tools, related procedures, and their presentation in relation to the successful fulfillment of the university's primary tasks.

3.D Deepening of clear information about news and changes in IT tools, co-workers "behind them" and care for further improvement of this communication.

3.E In cooperation with the student public, we will also open CPS to be suitable for public discussion. First to professional topics of ICT, then to other areas; a conceptual connection with MU's planned cultural and social center.

3.F Cooperation with regional and municipal administration and self-government (especially with the South Moravian Region and the statutory city of Brno) for the use of expertise in data processing in the evaluation effectiveness of communication with the public, submission of expert opinions, etc.

3.G ICS will support the development of Open Science topic and related Open concepts from public (Open Data) and private sector (Open Innovation) as new forms of advanced communication and visualization of scientific and professional topics for the general public, public administration and industry (infrastructure development for scientific diplomacy).

4 PERSONNEL MANAGEMENT AND EMPLOYEE DEVELOPMENT

STRATEGIC PRIORITIES

4.1 Be an attractive employer for top scientists and IT professionals offering open personnel policy with appropriate personnel management processes and motivation for excellent performance.

4.2 Continuously cultivated internal environment, which is motivating for employees in the sense of identification with the employer, active participation in promoting ICS and its activities.

KEY RESULTS AND INDICATORS

4.I Acquired and long-term maintained HR Award.

4.II Increase the share of foreign researchers and non-researchers at ICS, increase the number of workers with experience of living abroad.

4.III Increase the share of women in research and IT professional positions.

4.IV Created and actively used onboarding system, with particular emphasis on IT professionals.

4.V Established and actively used career rules for research, IT and non-IT positions, and related internal evaluation system for all employees.

4.VI Increasing use of tools to support work–life balance.

4.VII Professional HR team that employees turn to with confidence with issues they need to address.

TOOLS FOR ACHIEVING STRATEGIC OBJECTIVES

4.A Promoting ICS to the public (outside the university) including the form of ICS as an employer suitable for parents, women and other disadvantaged groups; active involvement of employees in this process.

4.B Introducing mentoring.

4.C Transparent job advertisements, including an indication of remuneration, number of vacancies, career opportunities and information on the selection process.

4.D Introducing bilingual internal communication, support for the development of employees' language skills.

4.E Establishing an internal forum for parents to share experiences in the field of reconciling family and work at ICS, an internal promo of existing possibilities of reconciling work and family at ICS.

4.F Continuously improving the internal employee evaluation system, flexible intervals concerning job positions, active cooperation in developing IT support for the evaluation system.

4.G Introducing a system of internal education, both in professional and especially soft knowledge; use of e-learning courses and training; creation of a specific training program for senior employees (especially middle management); creation of internal workshops for members of the selection committees.

4.H Creating a clear and simple process for complaints from employees and the active use of information, suggestions and data obtained from employees to improve and solve the work environment and individual problems.

5 MU PROFESSIONAL IT BACKGROUND

STRATEGIC PRIORITIES

5.1 ICS is the expert service center and guarantor of professional IT services for MU, which proactively develops with the help of "state of the art" procedures, using the results of the own research and development and with the increasing use of automation, controlled based on collected operational data by BI / AI procedures.

5.2 MU is the organization with entirely digitized economic processes, and ICS is the guarantor of their creation, maintenance and optimization.

5.3 MU is the organization with the modern background for working with bibliographic data.

Activities in this area are further divided into the following areas:

Information Systems

5.4 ICS operates and continuously develops a new generation of ERP systems for MU.

5.5 ICS is the accepted leader in the development of ERP systems for higher education.

5.6 ICS is the creator and guarantor of the MU integration platform for IT systems and applications, which provide data and functionality primarily (but not only) in the field of economics and human resources and is at the same time methodology and holder of know-how in the field of integration of information systems at MU (business and process analysis, enterprise architecture and integration, SW development).

5.7 ICS is the leading partner in creating management information systems (MIS) for decision-making on all levels of management (Data-Driven University).

Cybersecurity Facilities and Services

5.8 ICS is the guarantor of a secure IT environment of the university, the bearer of the principle of "security by design," and the active partner in defining and implementing MU security policies.

5.9 CSIRT–MU is the respected and recognized expert workplace at the national and international level, working closely with national and international authorities and organizations in cybersecurity and cyber defense and with leading academic institutions in the Czech Republic.

5.10 CSIRT–MU is the first choice for external partners in cooperation with the university in cybersecurity and cyber defense.

IT Services

5.11 In close cooperation with faculty and other workplaces, ICS provides a comprehensive portfolio of IT services across MU and is the guarantor of their further development following modern trends in IT.

5.12 ICS is the guarantor of modern IT resources for flexible cooperation and the methodology of their effective use.

5.13 ICS is the guarantor and methodology in the field of management of MU IT services.

E-infrastructure Services

5.14 ICS develops and provides a leading IT infrastructure for large-scale computing (HPC) and work with large datasets, including environments and tools for their advanced analysis (even with the use of artificial intelligence methods); ICS is the integrator of computing and storage capacities for MU.

5.15 ICS provides and operates IT infrastructure facilities for all IT services, whether on-site (at MU hardware) or in the cloud (using commercial and community solutions).

5.16 MU e-Infrastructure is suitably integrated into the national e-infrastructure and IT thematic parts infrastructures and is part of the EOSC environment in the Czech Republic; ICS is a leader in the field of work with and efficient use of large and powerful distributed systems.

5.17 ICS is the respected partner and the first choice in the field of storage and further work with sensitive data.

KEY RESULTS AND INDICATORS

5.I Successful implementation of the selected new generation ERP system, ensuring its operation and extension by a module CRM and other functionality according to the university's needs.

5.II Architecture is created, and subsequently, an integration platform for information systems at MU is implemented.

5.III Platform for creating data warehouses is created; it is used in the implementation of MIS and deployment in university agendas

5.IV The system of coordinated collection and management of requirements is established and routinely operated, including relevant workflows and their semi-automated evaluation using BI / AI tools.

5.V Continuously increasing reliability and availability of key university systems, ensuring fast recovery after a failure.

5.VI Selection, implementation and operation of a new MU library system.

5.VII Provision and implementation of projects to support operational cybersecurity, usually as the leader of these projects.

TOOLS FOR ACHIEVING STRATEGIC OBJECTIVES

5.A Strengthening the security of MU cyberspace with an overlap to other universities, using research results implemented at ICS.

5.B Ensuring the identification of legal obligations arising from applicable legislation and adequate response to them (e.g., ZOKB).

5.C Developing the innovative approaches and open-source tools that will be recognized and used by the Czech Republic and the EU's security community.

5.D Constructing and operating the infrastructure for processing classified information to implement security projects and cooperation with state security forces.

5.E Setting up the advanced management of licenses used by MU (license life cycle).

5.F Completing service management implementation in cooperation and with the active involvement of the IT community at MU.

5.G Identification of critical IT systems of MU, creation and testing of Disaster Recovery plans.

5.H Active cancellation and consolidation of services and systems that do not support the MU strategy.

5.I Adapting the IT infrastructure to provide data for collection and operation evaluation. Extracting infrastructure data for decision-making at all levels of the university.

5.J Developing the modern data network, implementation of modern technologies, a capacity expansion for scientific data transfers, high flexibility, close collaboration with the CESNET association.

5.K Ensuring a competitive data and computing infrastructure (including setting up for its coordinated demand and funding) for demanding scientific applications (e.g., research in the field of biotechnology, medicine, advanced materials, etc.).

5.L Widespread deployment of virtual environments to support R&D at MU, such as environments for the use of AI technologies, environment for implementing practical training (simulated/emulated infrastructures), etc.

5.M Building data and computing infrastructure to develop, simulate, and test autonomous systems based on artificial intelligence (AI).

5.N Identification and use of commercial platforms in areas where this path shows greater benefit / effectiveness. For common user data use commercial platforms providing the most favorable price / performance ratio (e.g., MS O365).

5.O Developing tools and procedures for working with sensitive data and special categories of personal data (especially medical documentation), obtaining certification for storage and further processing of sensitive give.

5.P In close cooperation with the CESNET association and other institutions, design, implementation and further development of tools for long-term storage of digital data (so-called LTP), especially in connection with building data repositories for scientific data.

6 INSTITUTION MANAGEMENT AND INFRASTRUCTURE

STRATEGIC PRIORITIES

6.1 By 2028 latest, operate in the own university modern building satisfying standards of a significant IT workplace and an attractive employer in the field of IT and related applied research.

6.2 Ensure a highly robust and efficient IT background for the university by deploying to three geographically separate localities.

6.3 Develop and implement a strategy for long-term sustainable development of the university's e-infrastructure, with the involvement of all its components.

6.4 Provide a well-structured data warehouse for storing data from the university's operation and its buildings, operate an environment and tools that allow such collected data to be continuously evaluated for the needs of informed management of the operation of facilities and other assets university.

KEY RESULTS AND INDICATORS

6.I Construction of a modern computer room in UKB (FarmaHub), complying with current and expected future safety, capacity, and environmental standards, emphasizing the ecological operation of energy-intensive equipment.

6.II Construction of a modern computer hall within the reconstruction and completion of the Botanická complex.

6.III Create, develop and provide a warehouse, methodology and tools for data processing using AI principles for building management systems.