77 NRP

Digital Transformation
National Research Programme

Call document

FNSNF
Fonds national suisse
Schweizerischer Nationalfonds
Fondo nazionale svizzero
Swiss National Science Foundation

Contents

What are National Research Programmes (NRPs)?

Research carried out by National Research Programmes consists of research projects that contribute to the solution of contemporary problems of national importance. Under the provisions of Article 10, paragraph 2, of the Federal Act on Research and Innovation of 14 December 2012 (version of 1 January 2018) the Federal Council selects the topics and foci to be researched in NRPs and mandates full responsibility for implementing the programmes to the Swiss National Science Foundation.

The Federal Ordinance on the Federal Act on Research and Innovation of 29 November 2013 (version of 1 January 2018, Article 3) describes the NRP funding scheme as follows:

"[1] The National Research Programmes (NRPs) of the Swiss National Science Foundation (SNSF) are a means of generating and conducting coordinated research projects that pursue a common goal.
[2] Topics of research are generally appropriate for National Research Programmes if:

a. Swiss research can make a significant contribution to the resolution of the problem;

b. solutions require research contributions from multiple disciplines;

c. research on the problem can be expected to produce research results that have practical applications within a five-year period.

[3] In exceptional cases, an NRP may also be used for the targeted creation of additional research potential in Switzerland.

[4] The following criteria are also taken into consideration in setting forth the topics of National
Research Programmes:

a. the programmes can provide the scientific basis for decision-making by the government and administration;

b. the programmes can be conducted with international collaboration".

Summary

The new National Research Programme “Digital Transformation” (NRP 77) will investigate the interrelationships and specific effects of digital change in Switzerland. The programme sets out to understand what needs to be done to face up to the challenges of digitalisation. Research will be carried out into the opportunities and risks that digital change poses for society and the economy in Switzerland. This will provide a basis for developing possible ways of making full use of the opportunities, and mitigating any negative effects. Additionally, the NRP will provide a basis upon which to develop an optimum framework for effecting digital change in society, including the know-how required by a range of institutions and sectors.

The NRP comprises three research modules:

Education, learning and digital change: This module will look at the impact of digitalisation on education (content, skills and skills transfer), at life-long processes and at the institutions pertinent to education. It aims to identify the opportunities and challenges and devise strategies for developing the education system at all levels. Research in this module will pertain to all facets of learning and education.

Ethics, trustworthiness and governance: Central to this module are the ethical, organisational, legal and technical challenges involved in ensuring and building trust in digital infrastructure and digital services. These challenges will be addressed with regard to specific fields and in the light of the latest technological developments such as blockchain, internet of things and cybersecurity.

Digital economy and the labour market: This module will address the key interactions of digital change and their effects on the economy (Swiss productivity and competitiveness). It will look at new digital markets, organisational forms and business models and their effect on the world of work, the organisation and content of our work, and regional development in Switzerland, in order to identify the opportunities and risks involved.

The programme will operate with overall funding of CHF 30 million and carry out research for a five-year period.

1. Introduction

Background

Our lives are increasingly intertwined with digitalisation: almost every (financial) transaction is mediated by computers; families and groups are being transformed by new forms of communication and new means of perception, research, planning and even action; novel technology such as smart phones, navigation systems, drones and social medial platforms alter traditional forms of government, services and commerce; innovations continue with the internet of things, self-driving cars, blockchain and cryptocurrencies, spoken language digital home assistants … the list is almost never-ending. Social and technical developments shape and drive each other in an intertwined, co-constitutive process. Switzerland is in a very good position in terms of telecommunications infrastructure as well as the use of information and communications technology (ICT). The Swiss population can therefore benefit from increasing digitalisation in all walks of life, not only to maintain but also to increase prosperity and quality of life as well as human fulfilment and democratic participation.

To make the most of these opportunities, Switzerland needs to address a number of challenges as well as identify risks at an early stage and respond to them adequately. This concerns, e.g., the needs of individuals, institutions, regulations, governance to adapt to the new environment created by the rapidly increasing digitalisation of our society. Moreover, fears associated with digitalisation—such as job losses, negative implications for democracy, the loss of individual freedoms and losing control over artificially intelligent machines—need to be accounted for, fact-checked and addressed.

Research can address open questions in order to provide a basis for weighing policy options aimed at exploiting opportunities while mitigating risks, alleviating fears and helping to develop novel, innovative strategies and solutions for navigating digitalisation in Swiss society and beyond. Digital transformation and its effects are currently key topics in all developed industrial societies and are being addressed accordingly in dedicated research projects and programmes (with varying resources) in many countries. The recent past, in particular, has seen an intensification of research and innovation efforts with regard to digitalisation. To ensure and strengthen its position as well as to partake in and help shape these efforts being made abroad, Switzerland needs to invest in research initiatives such as this NRP. For this reason, the Swiss Confederation has defined a broad action plan involving various measures in the research, innovation and education domains, among them the present NRP “Digital Transformation”.

Mandate

On 8 March 2018, the Secretariat for Education, Research and Innovation (SERI) mandated the Swiss National Science Foundation (SNSF) to develop a programme concept on the subject “Digital Transformation in Economy and Society”. The National Research Council of the SNSF elected the members of the Steering Committee on 9 May

2018. The Steering Committee will ensure the strategic management of the programme for its duration. As a first step, the committee defined the form and contents of the programme in a concept paper, which was approved by the Federal Council on 21 September 2018. The programme concept served as a basis for the call. NRP 77 will operate with an overall funding of CHF 30 million and conduct research work for a period of five years.

2. National and international research environment

In recent years, some important research work in areas covered by this NRP has already been undertaken in Switzerland. Examples include NRP 75 “Big Data” and the “Digital Lives” initiative as well as individual projects funded by the SNSF and by the Academies, including the TA-SWISS Foundation for Technology Assessment. In addition, a number of initiatives are being launched, such as the "digital skills" programme by *swissuniversities*, which aims at developing skills in the tertiary education sector. However, a full-blown research programme with a focus on how digital change is intertwined with individual, organisational and societal developments in a comprehensive and integrated way is still lacking

In the humanities and social sciences, as well as in the STEM (science, technology, engineering and mathematics) and in the medical disciplines, numerous efforts are being made to strengthen the competitiveness of Swiss research. At the international level, many initiatives have been launched to investigate the interconnected causes and effects of digitalisation. Hence, there is some (albeit selective) collaboration between scientists, and many researchers have started investigating research questions of interest to this programme. To a certain extent, this has led to some useful initial insights. However, the current somewhat uncoordinated state of research can still only provide a fragmented picture of digitalisation. Consequently, special attention will be paid in this programme to ensuring that the projects selected build on, and supplement existing research and address research gaps.

Furthermore, since the field of interest is rapidly changing, and to provide an integrated tapestry of insights across the issues arising from digitalisation, there is considerable need for further research. This new NRP should therefore tie in with national and international research programmes, projects or initiatives, but with a focus on generating added value in view of the specific risks and opportunities that digitalisation poses for Switzerland. It should also relate to existing national strategies such as the “Digital Switzerland” strategy, the “National strategy for the protection of Infrastructures”, the “National Strategy for the protection against cyber risks”, and the “National strategy for sustainable development”.

An overview of the current initiatives can be found on the NRP 77 website (http://www.nrp77.ch/en/the-nrp).

3. Objectives and priorities of the programme

The ultimate objective of the programme is to generate knowledge about the opportunities, risks, challenges and solutions that digitalisation creates for society. The NRP will (1) analyse the impacts of digital changes in Switzerland as well as (2) develop possible interventions, experiments and solutions that will make it easier to leverage the opportunities and respond adequately to the risks, thereby paving the way for the optimal management and governance of ongoing and future digital transformations.

This objective will be reached by:

- Analysing formal and informal education content, tools and institutions as they relate to ongoing digital change, covering the whole life span of an individual and considering all levels and types of education;
- Understanding how digital transformation (1) can alter peoples' conception of ethical behaviour (on the individual and societal level) as well as the development of trustworthiness and (2) how it can be managed to the benefit of people and societies, while safeguarding trustworthiness, public values and fundamental rights;
- Generating knowledge about the opportunities and risks of digital transformation at all levels of the Swiss economy (macro-, meso- and microlevels) and for the individual regions and environment types (urban and rural spaces), identifying the related interdependencies in view of the transformation and studying opportunities and risks in the labour market. These results will be gathered with a special focus on the Swiss political, social and economic setup by considering the impact of these changes on policy areas, such as regional and spatial development, mobility, health and the environment.

In terms of **communication and knowledge transfer**, the goals of NRP 77 are to ensure that the education sector, legal actors, the business world and other stakeholders are aware of the opportunities, challenges and risks linked to digital transformation and the specific options for action – against the backdrop of a global, worldwide transformation.

The programme will promote exchanges between the researchers, the practitioners and the programme's target audience for the entire duration of the NRP, and ensure that the NRP's results and recommendations are disseminated effectively at the conclusion of the programme, in close collaboration with the researchers.

4. Main research topics

The topics "education, learning and digital change", "ethics, trustworthiness and governance" and "economy and labour market" are interconnected and have a reciprocal influence on each other. Projects may focus on topics relevant to the thematic clusters

listed below in a given module, but may also have a bearing on the thematic clusters listed in one or in both of the two other modules outlined in this chapter. The NRP will strengthen synergies and ensure close coordination between the projects from the different modules. It also expects projects to address some cross-cutting issues (see page 10).

"Education, learning and digital change" module

This module investigates the implications of digitalisation for the role of education and learning in society, analyses the opportunities, challenges and risks, and develops strategies for managing the transformation of the education system. Research proposed for this module may concern all facets of learning and education from early childhood through to senior citizenship, including all types (formal, informal) of educational settings (compulsory and grammar school, vocational training, universities, job-related, volunteering-related, etc.) as well as how these changes and the increased availability of data impact teachers' training and professional practice as well as the education system as a whole. Thematic clusters in this module are:

1. People in Switzerland, irrespective of age or educational background, will have to gain new skills and expertise throughout their lives in order to play a role in shaping the continual digital transformation: deriving and specifying the bodies of knowledge as well as the types of skills (including meta-skills) potentially concerned.
2. Types of transformation in learning and assessment processes. Types of digital infrastructures, methods, tools and environments with which learning processes can be improved in terms of quality and which will best serve the needs of educators and students. The effect of digital services on didactical approaches and learning processes.
3. Spatial and temporal changes to teaching and learning brought about by digitalisation. The relevance of new actors for the education system. Importance for the role of education in society.
4. Measures needed to acitively shape the transition process. Ensuring the visibility/measurement and monitoring of the changes. Defining the direction of future developments in the education system in connection with digitalisation.

"Ethics, trustworthiness and governance" module

The aim of the module is to analyse opportunities and risks, to assess how they relate to each other, and to develop and propose practical solutions at all societal levels (macro, meso, micro) with a view to, on the one hand, an ethical assessment of the opportunities and risks of digitalisation and of the compatibility with basic norms and fundamental rights in Switzerland and, on the other hand, with regard to the conditions for the creation of trustworthy digital infrastructures/services by various users and user groups in business, government and society. These topics are of particular importance in the light of risks related to cybersecurity and terrorism as well as

changes in the cultural context due to the worldwide availability of cultural assets. Thematic clusters in this module are:

1. Societal, institutional, organisational, technological, economic and regulatory conditions for the realisation of public values and basic human rights in digital infrastructure and services.
2. Impact of digital transformation on society, democracy, the economy, government, legal and regulatory framework, cultural identity and public values, considering additional aspects such as social/individual expectations, presupposed values, implicitly or explicitly accepted norms and any legal regulations derived therefrom as well as the trade-off between liberty and security.
3. Address fundamental rights, protection of individuals, workers, organisations, groups, localities, nations and other (virtual) spheres, not only from terrorism or interference by nation states, but also from transformed individual and social identities due to interaction with, and dependency on, transnational digital infrastructure.
4. How do changes in communication technology/"new" media influence society at all levels (macro, meso and micro), e.g. avoidance of societal fragmentation, political information (news production, news distribution, news consumption) and the consequences for trust in political institutions and in democracy itself? What responsibilities and new tasks does the state have in this context?
5. What alternative approaches to generating trust might there be in the digital transformation?
   (May include inter- and transdisciplinary projects that propose approaches, infrastructures, and/or regulations for achieving, communicating and promoting trustworthiness as well as the governance of those approaches.)
6. How do people make decisions that have an impact on the security and trustworthiness of IT-based or digital systems and what interventions (e.g. in terms of education or design changes) can improve their decision-making and make them more trustworthy?

Projects in this module should address the goals above in a multi-faceted, interdisciplinary approach. Strong links to the other modules are expected.

"Digital economy and labour market" module

The aim of this module is to examine the effects of digital transformation on the economy and the labour market at all levels, on companies, markets, organisations, institutions, collaborative groups,[1] as well as at the individual level and at the level of spatial and regional development. It also aims to identify associated opportunities and risks and develop optimal, sustainable forms of governance and policy measures to realise and manage them. The thematic clusters in this module are:

[1] Collaborative groups are a major production factor in the digital domain, creating critical products and infrastructure such as the Wikipedia open source software, or making their laboratories available to science (in citizen science projects).

1. What type of impact will digitalisation have on the Swiss economy as a whole and particularly on competition and prosperity, the labour market (employment, salaries, conditions for workers) products, services and (digital) business models, on corporate development (including digital start-ups) and performance (productivity, innovation and employment) and on the competitiveness of Swiss companies? The effects of these changes are also of interest for policy areas such as regional and spatial development, mobility, health and the environment.
2. Digital markets and platforms, newly emerging organisational forms and data-driven business models, their mechanisms and their impacts on traditional markets. How should they be designed to promote innovation and efficiency, but also to be socially acceptable? What is the role of trust, privacy, and regulatory safeguards for their functioning? How do emerging platforms, new intermediaries and organisational forms influence new business models?
3. What will be the impact of digitalisation on the nature of work and the labour market outcomes? How do forms of work change (e.g human-machine interaction, mobile work, crowdworking, peer production)? What is the role of workers' education and training? What are the resulting new demands with respect to the organisation of work, the forms of collaboration, the task composition of jobs, the competence profiles and leadership of employees, and the resulting labour markets? What are the consequences for individuals and the development of individual careers?
4. The changes at administrative institutions due to digitalisation (e-government), offering open data, developing electronic services and connecting them across different administrative levels. How can companies, citizens and communities benefit from the digitalisation of administrative services?
5. The associated needs for action in individual policy areas, such as the social security system, tax system and regulatory framework, in order to ensure fair competition, consumer protection and innovation capabilities.
6. How is digitalisation related to other structural megatrends such as globalisation or demographic change and the associated adaptations of social institutions (e.g., the administration, healthcare and the education system)?

Cross-cutting topics

There are several cross-cutting topics that are relevant to all three modules.

Data and data observatories

One possible output of the projects could be to aid in the development of new datasets and/or data observatories (i.e. research infrastructures for the continuous collection/analysis of data) as well as to establish new links between existing or new datasets where these are necessary for research into topics that are relevant to the NRP.

It is vital that the future re-use of such data (by third parties) is explicitly considered. Also, where possible, this should be done in collaboration with existing institutions.

In the development of new data sets for economic analyses and data observatories for trend analyses, we particularly welcome studies leveraging innovative, non-registry datasets gathered and analysed via novel methods, such as mobility data, process data, or self-contributed data based on sensors.

The Steering Committee strongly encourages coordination with databases of official institutions at all levels of government (e.g. the cantonal authorities for the module "Education, learning, and digital change").

All projects must show that the data owners cooperate/consent to/support the use of their data and ensure that all data was obtained in line with current data protection laws and ethical standards.

Agility and foresight

Digitalisation is rapidly changing our environment. Hence, the projects of NRP 77 should not only analyse changes in retrospect, but also try to address current issues and anticipate possible future developments. Research projects need to ensure that the outcomes will still be relevant after the five-year research phase, how the research can produce sustainable outcomes and, ideally, responses to future changes.[2] Agile project management is essential and applicants should describe how they take into account fast-changing requirements (in terms of both methodology and topics), how they may respond to ongoing changes.

A number of projects are expected to shed light on the possible emergence of new institutions in the digital society and how they might help to create and shape new opportunities.

The quantification of activity

Digital technology drives the quantification of numerous phenomena, often moving society into a new era of information gathering, assessment and judgement (e.g. health apps, activity apps, performance tracking). What are the consequences? Are they desirable and, if so, under what circumstances? How can we ensure that goals that are difficult to quantify or measure will not fall by the wayside?

Further issues

NRP 77 especially welcomes interdisciplinary approaches that reflect the richness and diversity of multiple disciplines. Connecting the social and behavioural sciences with computer science and engineering seems particularly warranted in NFP 77 and, as an additional asset, the projects may also include transdisciplinarity.

[2] Digitalisation has already caused various changes, which have often gone unrecognised and unstudied. Hence retrospective data analysis, assuming it helps in predicting future developments, is also encouraged.

Proposals need to be state of the art and competitive compared to international research standards and need to address practical questions that are relevant for Switzerland, ideally using or generating Swiss data sets.

5. Practical significance and target audience

Research within the framework of this NRP, with its limited means and duration, will not be able to contribute to all of the issues addressed in the three modules. However, it will be able to answer a large number of urgent questions and provide meaningful, evidence-based initial responses, recommendations and specific options for action to stakeholders in the education sector, to legal and regulatory actors, the business community and other relevant stakeholders.

The practical benefits of the three modules may be summarised as follows:

Knowledge gathered in the module "**Education, learning and digital change**" will be vital for ensuring social participation in which informed, engaged and empowered citizens ensure sustainable and productive solutions for societal challenges and opportunities caused by changing digital technologies in all relevant life contexts (e.g. family, school, work, leisure or politics). As a country with few natural resources, Switzerland has a particular interest in enabling the knowledge-intensive activities of its citizens, public institutions and private companies. Hence, the role of education in digital change and digitalisation in education—from early childhood through the entire life span, formal and informal, irrespective of initial levels of education—is of the utmost importance for Switzerland. Research in the module "Education, learning and digital change" will contribute to our understanding of what needs to be learned (e.g. in terms of contents and skills) at each stage in life, how (e.g. in terms of pedagogical setting) and where (e.g. in school, at the workplace, online, or elsewhere) as well as how the transformation from the current learning paradigm to those expected to be dominant in the future can be achieved.

The questions that arise with digitalisation in the area of "**Ethics, trustworthiness and governance**" are also of extraordinary social and economic relevance. Even if they can only be partially resolved at the national level, research can make a significant contribution to resolving questions arising in the context of digital ethics and fundamental rights, to conditions for improving appropriate and informed levels of trust in novel technologies, as well as to the trustworthiness of digital infrastructures and services, including appropriate governance frameworks. Contributions from both basic and applied research will be essential in understanding how digital transformations alter and benefit people, both in terms of individuals and of society at large. The area of "Ethics, trustworthiness and governance" could potentially achieve a significantly broader impact, not only by improving the quality of the digital experience of individuals, but also by taking advantage of opportunities and recognising risks in domains such as digital markets, digital democracy or digital governance.

Many of the opportunities and fears in connection with digitalisation are in the area of the "**Digital economy and labour market"**: in the course of digitalisation, economic

systems, production processes and the provision of services will change fundamentally. In addition, new digital business models will likely develop and open up new markets, thereby challenging established companies. While this offers excellent opportunities for the Swiss economy and workforce, it may also pose certain challenges. Current employment scenarios range from highly pessimistic (predicting job losses) to optimistic (predicting the creation of new jobs), but generally agree that the nature of employment is likely to change—a topic on which this NRP also hopes to shed light. Either way, the creation of new employment relationships will only succeed if employees, companies, the markets and society as a whole adapt to and take advantage of the newly emerging opportunities, and if the legal/institutional framework conditions are developed in a way that facilitates the exploitation of these opportunities. Research conducted in the "Digital economy and labour market" module is essential for these purposes. Academic research can make a significant contribution to the study and solution of adaptation problems in the economy and labour market (including its transformation or structural effects) and make it easier to take advantage of newly emerging opportunities.

Cutting across all three modules, the inadequacy of the existing empirical data basis presents a particular challenge for NRP 77. Hence, the NRP aims to make an important contribution towards closing this gap and envisages close collaboration with federal, cantonal or communal offices as well as universities and other research institutions (e.g. the Swiss Centre of Expertise in the Social Sciences FORS).

6. Submission procedure and project selection

General conditions

Proposals are submitted and selected in a two-stage procedure: pre-proposals are submitted first, followed by an invitation to submit a full proposal. Pre- and full proposals are expected to be submitted in English.

Research projects conducted under NRP 77 should last from a minimum of 36 months to a maximum of 48 months. NRP 77 will not fund the fourth year of PhD students' salaries in projects lasting under 48 months. Thus, projects lasting under 48 months and employing one or more PhD students must ensure their salaries are guaranteed for 48 months at project selection.

The average budget of a project is expected to lie between CHF 300,000 and 600,000. These figures are provided as a benchmark, and budgets below or above this range are not ruled out.

Collaboration with research groups in other countries is possible, provided the cooperation either generates significant added value that could not be achieved without cross-border cooperation, or that substantially enhances the proposed research with respect to content or methodology, or if the competence of researchers from abroad is essential for the successful completion of the project. As a rule, the funding share requested for researchers abroad may not exceed 30% of the overall budget. For applicants from abroad, the norms and salary rates of the relevant country will be applied

mutatis mutandis, with the SNSF maximum rates as the upper limit. Before submitting a proposal with a cross-border component, please contact the programme managers of NRP 77.

Collaboration with other NRP 77 projects is strongly encouraged. Projects should plan an equivalent of approximately one month per year, spread across the year, for inter-project collaboration. Collaboration at the national level, with projects outside NRP 77 is welcome and encouraged.

To allow for optimal coordination, approved projects must start no later than four months after the approval date.

The present Call document of NRP 77, the Funding Regulations of the SNSF and the General implementation regulations for the Funding Regulations provide the legal basis for the call. All forms, rules, regulations and instructions for the submission of proposals can be found on the mySNF web portal under 'information/documents' after selecting the corresponding NRP and creating a new application.

Only one call for proposals is envisaged. However, in the event of significant thematic gaps, a second call may be launched.

Online submission on mySNF

Pre- and full proposals must be submitted online via the mySNF portal (www.mysnf.ch). Applicants need to register as mySNF users before they can submit an application. User accounts obtained in the past remain valid and provide access to all SNSF funding schemes. It is advisable to request new user accounts as early as possible via the mySNF homepage.

Pre-proposals

The deadline for the submission of pre-proposals is 25 February 2019, 17:00 Swiss local time.

In addition to the administrative data that needs to be entered directly in mySNF, the following documents must be uploaded in PDF format:

- **Project description**

  Applicants must use the template provided on the mySNF portal under 'information/documents' in their newly created proposal. The project description includes details about the project team and the module allocation as well as five key publications of third parties regarding the project and a research plan. The project description must not exceed six pages, including the cover-page.

- **Short CVs and list of five key publications** of the applicants

  The CVs and the list of five key publications must not exceed a maximum of two pages for each applicant. Links to full publication lists may be included.

Project descriptions and CVs exceeding the indicated length will not be considered.

Full proposals

The deadline for submitting full proposals is expected to be 9 September 2019, 17:00 Swiss local time.

Besides the administrative data and the data management plan to be entered directly in mySNF, the following documents need to be uploaded in PDF format:

- **Research plan**
  Applicants must use the template provided on the mySNF portal under 'Information/documents' in their newly created proposal. The research plan must not exceed 20 pages, including the cover-page, tables, illustrations and the list of references.
- **Short CVs and publication lists of all applicants**
  The CVs must not exceed two pages each. Publication lists must be submitted according to the guidelines published on mySNF. Links to full publication lists may be included.
- **Supplementary documents** (support letters, confirmation of cooperation or co-financing, ethical approval, etc.) can be uploaded on mySNF. As stated under the item "Data and data observatories" in section "Cross-cutting topics», please upload here the requested confirmation for the use of existing or the generation of new data sets.

Project selection

The Steering Committee evaluates the pre-proposals and reaches final decisions based on the selection criteria outlined below. In the process, it may refer to assessments provided by national and international reviewers.

In the second stage of the submission procedure, the Steering Committee will invite the authors of the selected pre-proposals to submit a full proposal. In the invitation, the Steering Committee may include recommendations or set conditions for the full proposal. Authors who are not invited to submit a full proposal will be informed accordingly by means of a ruling.

Based on external reviews as well as on their own evaluation, the Steering Committee will recommend a selection of full proposals to be either approved or rejected by the National Research Council (Programmes division and Presiding Board) of the SNSF.

Selection criteria

The Secretariat of the Programmes division checks whether the personal and formal requirements are met before forwarding the proposal for scientific review (cf. chapter 2 of the Funding Regulations of the SNSF). Pre- and full proposals that do not meet the personal and formal requirements will not be processed further.

Pre- and full proposals will be reviewed based on the following criteria:

- **Compliance with the goals of NRP 77**: Proposals must reflect the programme's objectives, including the cross-cutting topics, as delineated in chapter 4, and comply with the programme's overall framework.
- **Scientific quality:** Proposals need to be state-of-the-art and comply with international research standards in terms of scientific quality and methodology. Proposals must contain an innovative component and they must be relevant compared to completed or running research projects in the same field.
- **Inter- and transdisciplinarity/cooperation projects**: Proposals need to be of an interdisciplinary nature and where applicable they may also include transdisciplinary work, connecting different levels of analysis (micro/meso/macro) work with stakeholders. Connecting computer science and engineering with the social and behavioural sciences, where suitable, could be of particular interest.
- **Application and implementation:** The potential for practical application and the implementation of results is a key element of NRPs. Projects with high practical relevance and projects that aim to develop answers to current and upcoming challenges in the economy and society are therefore given priority. The selection will also take into account whether the expected results from the programme can serve as a scientific basis for governmental and administrative decisions.
- **Personnel and infrastructure:** Applicants must have a sound scientific track record in the field of the proposal. Adequate personnel resources and an adequate infrastructure must be secured for the project.
- **Response to comments:** The Steering Committee may address comments, suggestions or recommendations to the research teams when inviting them to submit a full proposal. The implementation of such suggestions or recommendations will be assessed in the full proposals.

Schedule and budget

At present, the following schedule is envisaged for NRP 77:

Publication of the call for pre-proposals	30 November 2018
Deadline, submission of pre-proposals	25 February 2019
Invitation to submit full proposals	15 June 2019
Deadline, submission of full proposals	9 September 2019
Final decision on full proposals	13 December 2019
Start of research	1st January to 1st May 2020
End of research	31 December 2024
Publication of the programme synthesis	Summer 2026

Research projects cannot be prolonged beyond the duration of the research phase of the programme and will submit their final scientific report at the end of the programme's research phase.

NRP 77 will operate with an overall budget of CHF 30 million and carry out research for a period of five years. Projects within NRP 77 will run for a maximum of four years. After project selection, the research projects will start doing research within four months of the date of the decision.

The indicative allocation of this funding between the different research modules and administrative activities is as follows:

Module education, learning and digital change	CHF 9.0 million
Module ethics, trustworthiness and governance	CHF 9.0 million
Module digital economy and labour market	CHF 9.0 million
Administration, programme synthesis, communication and dissemination	CHF 3.0 million

The Steering Committee may adjust this allocation as it deems necessary.

7. Contacts

For questions regarding the submission of pre-proposals and full proposals, please contact the programme managers:

Barbara Flückiger Schwarzenbach, nfp77@snf.ch or 031 308 22 22

Marjory Hunt, nfp77@snf.ch or 031 308 22 22

For questions concerning salaries and eligible costs, please contact the Head of Finances, Roman Sollberger: roman.sollberger@snf.ch or 031 308 22 22.

Technical help with mySNF and electronic submissions

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8. Actors

Steering Committee of NRP 77

Professor Abraham Bernstein, Department of Informatics, University of Zurich (president)

Professor Irene Bertschek, Centre for European Economic Research, Mannheim, DE (deputy president)

Professor Bert Bredeweg, Institute of Informatics, University of Amsterdam, NL

Professor Joanna Bryson, Department of Computer Sciences, University of Bath, UK

Professor Kevin Crowston, School of Information Studies, Syracuse University, New York, USA

Professor Natali Helberger, Faculty of Law, University of Amsterdam, NL

Professor Åsa Mäkitalo, Department of Education, Communication and Learning, University of Gothenburg, SE

Professor Manuel Puppis, Faculty of Social and Economic Sciences, University of Fribourg

Professor Ursula Staudinger, Mailman School of Public Health, University of Columbia, USA

Delegate of the Programmes division of the National Research Council

Professor Uschi Backes-Gellner, Department of business administration, University of Zurich

Programme Managers

Dr. Barbara Flückiger Schwarzenbach, Swiss National Science Foundation (SNSF)

Dr. Marjory Hunt, Swiss National Science Foundation (SNSF)

Head of Knowledge Transfer

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Representatives of the Swiss Federal Administration

Dr. Stefan Leist, Labour Market Analysis and Social Policy, State Secretariat for Economic Affairs (Seco)

Dr. Johannes Mure, Education Management and Research, State Secretariat for Education, Research and Innovation (SERI)

Representative of the Swiss Conference of Cantonal Ministers of Education (EDK)

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