



**SystemsX.ch**

The Swiss Initiative in Systems Biology

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## **2<sup>nd</sup> Call for Proposals for Projects within the Framework of SystemsX.ch**

In its Message on Education, Research and Innovation for 2008-2011, the Federal Council has proposed to provide funds to the SystemsX.ch initiative.

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## 1 What is Systems Biology?

The primary objective of Systems Biology is to achieve a **comprehensive understanding of the quantitative behavior of biological systems** that arises from the dynamic interplay of its components. It is expected that Systems Biology research projects will culminate in a mathematical model that simulates *in silico* the system's properties and predicts its quantitative response to internal or external perturbations. Frequently, biological systems are represented as networks of interacting elements, whereby the structure and the dynamic behavior of the network determine its phenotypic traits. The study of biological systems in this framework requires interdisciplinary cooperation and a division of labor between biologists, medical scientists, mathematicians, physicists, computer scientists, chemists and engineers. The present Call for Proposals is based on this definition of Systems Biology.

## 2 What is SystemsX.ch?

SystemsX.ch is a "simple partnership" which enables institutes, competence centers, and scientific research groups to interact and cooperate by establishing common technological platforms and sharing the data collected. The members of the partnership, i.e. the partner institutions, intend to position Switzerland among the world leaders in Systems Biology. SystemsX.ch will enhance and extend interdisciplinary research and education at the highest level in this field. It will develop and use the knowledge and tools necessary to expand our understanding of and ability to teach biology as an integrated quantitative science. It will foster the ongoing design, development, and application of advanced technology and the training of scientists and engineers in the special skills required to understand biological systems. To achieve its goals, SystemsX.ch relies on the creative talents of its scientific and professional staff and its ability to initiate and nurture partnerships between the projects associated with the program and with other academic institutions, private industry, and society.

As a result of the first Call for Proposals, a total of 35 SystemsX.ch projects started in summer 2008: 8 Research, Technology and Development projects (RTDs), 15 Interdisciplinary PhD projects (IPhDs) and 12 Interdisciplinary Pilot Projects (IPPs). Project details can be found on the SystemsX.ch website ([www.systemsx.ch/index.php?id=107](http://www.systemsx.ch/index.php?id=107)).

### 2.1 Goals of SystemsX.ch

SystemsX.ch, the Swiss Initiative in Systems Biology, aims at:

- gathering scientific competences on a national level to establish Switzerland at the forefront of the Systems Biology research;
- setting up and developing the cutting-edge technology required for Systems Biology research;
- implementing a truly interdisciplinary research culture by assembling complementary disciplines to stimulate mutual benefits;
- establishing collaborations with the private industry and SMEs in flexible forms of public private partnership;
- educating PhD students and young researchers for the future accordingly.

## 2.2 Scope of 2<sup>nd</sup> Call Projects

SystemsX.ch will support large integrated research projects that comply with above definition of Systems Biology. In addition, SystemsX.ch projects should allow sufficient support for training PhD students. Moreover, it will support pilot projects which explore new directions in this kind of research encouraging interdisciplinary education of PhD and post-PhD trainees. Proposals for Research, Technology and Development Projects (RTD Projects) that demonstrate the potential to significantly advance all aspects of Systems Biology research in Switzerland will be considered. However, in this second Call special preference will be given to proposals in the following three fields of research (see 3.1.2 for further details):

- I) Technology development.
- II) Systems Biology at the interface of medical research.
- III) Systems Biology at the interface to genomics.

Proposals for RTD and IPhD Projects will be evaluated by an international, interdisciplinary review panel of the Swiss National Science Foundation (SNSF). The IPP proposals are reviewed and evaluated by the SystemsX.ch Scientific Executive Board (SEB).

## 2.3 All-SystemsX.ch Day: An Information Forum

To provide further information on this Call for Proposals and SystemsX.ch in general, SystemsX.ch will be hosting the All-SystemsX.ch Day on October 16, 2008, in Basel. The event is open to anyone interested in Systems Biology. The RTD research projects funded by SystemsX.ch and other Systems Biology activities will be presented. During the lunch break, a poster session will demonstrate ongoing projects and also allow the participants to network with working groups. In the afternoon, workshops will be offered in which participants can coordinate the submission of research proposals.

Please find the program and registration info under <http://www.systemsx.ch/index.php?id=71>

## 2.4 Additional Information

Additional information about SystemsX.ch is available under [www.systemsx.ch](http://www.systemsx.ch). Please contact the SystemsX.ch Management Office if you have any questions ([admin@systemsX.ch](mailto:admin@systemsX.ch) 044 632 47 75).

## 3 Types of Proposals SystemsX.ch is Calling for

### 3.1 Research, Technology and Development Projects (RTD Projects)

RTD Projects are large interdisciplinary research projects. They can focus either on the in-depth analysis of a particular biological system using a systems approach as defined above, or on the development and implementation of novel technology (experimental or theoretical) that has a clear potential for broadly enabling Systems Biology research, or both.

A SystemsX.ch RTD Project is to be proposed and led by one main applicant. His/her institution, the so-called hosting institution of the RTD Project, will be responsible for the administration, coordination, and reporting of the project. Several research groups from complementary fields should contribute to the main project goals. If a proposal is approved, the main applicant will manage his/her project and ensure that it is carried out in an appropriate manner. Projects are encouraged that show an interdisciplinary character by linking research groups from traditionally separated disciplines. Generally, the team represented within an RTD Project should consist of researchers from at least two partner institutions. Scientists from non-partner institutions may also submit RTD proposals (see 3.1.4).

#### 3.1.1 RTD Project Characteristics

Systems Biology covers a number of different disciplines, but also a wide range of research methods, technologies, and development tools. Therefore, different types of projects can be considered by the review panel:

- Interdisciplinary research projects focusing on biological processes: This type of project will concentrate on the in-depth analysis of a specific biological system or multiple systems using a Systems Biology approach. Biologically oriented projects must demonstrate that they are implementing an integrated research approach aimed at the comprehensive, quantitative understanding of complex processes. This means that it culminates in the generation of a mathematical model that simulates the behavior of the system and makes quantitative predictions on this system's response to defined perturbations. Examples include the study of a particular biological or physiological process, or of a disease.
- Interdisciplinary research projects with a technological focus: To overcome the substantial technological limitations of Systems Biology, SystemsX.ch will support large integrated projects that target the development and implementation of novel and innovative technologies. Such technologies must possess the potential to overcome a documented limitation and broadly impact research in a wide range of biological systems. Technology oriented projects focused on data collection must demonstrate that they target new types of data for which there is no current acquisition technology available (as opposed to incremental improvements of current technology), that they are cutting edge and adhere to the idea of standardized data formats and verifiable data quality. Examples of technologically oriented projects include new approaches to the acquisition of biological data, new technologies for their computational analysis, or integration of (quantitative) data sets and technologies for the targeted perturbation of biological systems.

In fact, most RTD Projects might be a mix between the two types described above. However, each project is expected to contain substantial quantitative, computational, and/or theoretical research using cutting-edge technology.

### 3.1.2 Invitation for Particular Field to Submit RTD Proposals

After the first Call for Proposals, 8 RTD projects were approved and have been operational since summer 2008. As for the first call, for the second Call no topics are excluded. Criteria for project funding will be (1) scientific quality and (2) added value for Systems Biology (not “more of the same”). However, in the second Call strategic emphasis is placed on projects from areas not covered in the projects funded in the first round that are deemed to be particularly important for the field and research in Switzerland. Therefore, proposals in the following three fields of research are specifically encouraged:

- I) Technology development. Focusing on technology development projects is justified by since new experimental and theoretical approaches are required to analyze and describe the dynamic states of biological systems.
- II) Systems Biology at the interface of medical research. Focusing on this field is justified by the enormous impact on human health expected from the rigorous application of systems research to questions of biology in health and disease.
- III) Systems Biology at the interface to genomics. Focusing on this field is justified since genomics is one of the fundamental principles upon which Systems Biology builds. There are enormous opportunities arising from the application of genomics technologies and resources for Systems Biology research due to the wealth of data already available.

### 3.1.3 Duration, Finances

The duration of the projects will be four years. SystemsX.ch will fund RTD Projects with a maximum of up to 6'000 kFr. As required by law (University Law, Art. 13) and in accordance with the Message of the Federal Council on Education, Research and Innovation (p. 1353, German version), participating institutions must provide Own Contributions (in cash and/or in kind). Letters of intended own contributions must be attached to the proposal. However, details about Own Contribution will be negotiated after approval of the RTD projects.

Moreover, additional third party funds both from competitive research foundations (SNSF, CTI, EU, NIH, etc) and from the private industry are expected to be secured for RTD's. Such additional funding is, however, not a necessary condition for SystemsX.ch funding. Hence, the budget of each RTD Project consists of the following four funding sources:

- Funding requested from SystemsX.ch;
- Own Contributions: matching funds (at least as much as SystemsX.ch funds) from the partner institutions: (1) in cash **and / or** (2) in kind (see definitions below);
- Private industry: collaboration with partners from the private industry and SMEs;
- Others: funds directly linked to the project obtained from other competitive research institutions such as SNSF, CTI, EU, NIH, etc.

A total of 28 million CHF will be made available to fund this second call of RTDs. This money is meant to support a relatively low number (5 to 7) of integrated RTD projects over a period of four years. About one fourth is specifically allocated to the technology development RTDs (see sections 2.2 and 3.1.2). There is currently no plan to have any additional call for RTD proposals before the end of 2011.

## Own Contributions

The own contributions principle is a mandatory prerequisite (see above). The funds can be in kind and / or in cash.

### Definitions

“cash”: funds which are invested strategically to support SystemsX.ch projects and made available to the research groups whose project proposal has been accepted by SystemsX.ch. They are to be transferred to the account of the research group in question and reported in the annual financial report of the institution.

“in kind”: resources from the institutions' operating budget allocated explicitly to SystemsX.ch projects:

(1) Personnel paid from the institution's operating budget involved in SystemsX.ch projects according to the following table:

**Table “in kind”: lump sum per category (including salary, social charges, overhead services, infrastructures) to be calculated pro rata (max. of 20% for professors):**

|                     |         |
|---------------------|---------|
| Professor           | 250 kFr |
| Assistant Professor | 180 kFr |
| Senior Researcher*  | 150 kFr |
| PostDoc*            | 120 kFr |
| Technician*         | 120 kFr |
| PhD student*        | 50 kFr  |

\*) only if salary is paid from the institutions' operating budget

(2) From 2009 onwards: large equipment purchased from the institutions' budget is eligible for SystemsX.ch purposes on a pro rata basis.

(3) Earlier investments (e.g. infrastructure platforms made available to SystemsX.ch): the Scientific Executive Board will determine the eligible amount on a case-by-case basis.

### 3.1.4 Who May Apply for RTD Projects?

Faculty members of SystemsX.ch partners are eligible as main applicants. Experienced senior scientists from other Swiss research institutions are eligible as co-applicants (i.e. not main applicant). However, only SystemsX.ch partners and cooperating partners (according to the revised Research Law SR 420.1, Article 7, No. 4) are eligible to receive SystemsX.ch funding.

After approval by the SNSF, the RTD's hosting institution must become a SystemsX.ch partner prior to initiation of funding.

### 3.1.5 Documentation to be Submitted

The RTD proposals are to be submitted using the official forms consisting of the following parts:

**Part 1:** General Information

**Part 2:** Scientific Information

1. Summary (1-2 pages)
2. International standing of all applicants in their field of research (2-3 pages in total)
3. Research plan (maximum 30 pages in total. **Note:** any pages exceeding 30 will not be considered)
  - 3.1. Overall research questions, framework of the whole project, expected added value (max 5 pages)
  - 3.2. Research plan of each subproject: state of the art, questions, methods, milestones (max 6 pages for each subproject)
  - 3.3. Outlook for the next two years (1 page)
4. Justification of the Systems Biology approach, significance of the planned research for SystemsX.ch and future users (private industry, economy, medicine, etc.) (1-2 pages).

Annexes:

- Four-year full cost budget (Excel Budget forms provided)
- Signed letter of acknowledgement concerning Own Contributions from the host institution's management.
- CV and publication list over the past 5 years of all applicants
- Existing contracts, letters of support of existing or potential industry partners if applicable.

### 3.1.6 Submission Deadline

The RTD proposals are to be submitted by **15 January 2009** using the SNSF web platform *mySNF* ([www.snf.ch](http://www.snf.ch)) After the completion of the submission on the web platform, the thereby compiled PDF-file must also be sent to [admin@systemsX.ch](mailto:admin@systemsX.ch).

**Please note:** for SNSF to be able to guarantee *mySNF* access, new user accounts must be requested five working days before a deadline at the latest (from abroad: 2 weeks before the deadline).

It is the applicants' responsibility to ensure timely delivery of their proposal. SNSF and SystemsX.ch reject any responsibility for electronic / e-mail problems or any other problems.

### 3.1.7 SNSF Selection Procedure for RTD Proposals

The selection of the proposals will be preceded by a formal check by the SNSF administration. Proposals which fail to comply with the formal requirements will not be admitted to the next stage of the selection procedure and will be rejected if the defect cannot be easily remedied. The following formal requirements must be met:

- Compliance with the submission deadline (postmark)
- Use of the official forms and completeness of the proposal written in English
- Eligibility of the main applicant and the co-applicant(s)

- Acknowledgement of the need for own contributions in the case the proposal is approved for funding.. In a preliminary step, only the institution host belongs to must sign a letter found on the *mySNF* link.

Proposals will be selected by the Systems Biology Panel appointed by the SNSF, consisting of approximately 10 international experts from the relevant disciplines and six members of the National Research Council of the SNSF.

- The Systems Biology Panel will assess the proposals against the criteria specified below while taking into account the recommendations of the Scientific Executive Board of SystemsX.ch.
- The Scientific Executive Board of SystemsX.ch will evaluate the contributions of the submitted proposals to the goals of the SystemsX.ch initiative and forward its recommendation to the SNSF.
- The decisions must be approved by the National Research Council.

### 3.1.8 Selection Criteria

The Systems Biology Panel will select the RTD proposals according to the following criteria:

- I. Contribution to the progress of Systems Biology and integration into the overall SystemsX.ch initiative;
- II. Scientific quality including added value of the RTD-Project as a whole compared to the sum of all its sub-projects;
- III. Financial planning in general and distribution of the funding (total costs, own contributions, federal grant application, third party funding).

In addition to the above mentioned criteria, the standard scientific criteria set forth in the SNSF Rules of Procedure (Reglement über Gesuche SystemsX.ch, 3. Juli 2007; see [http://www.snf.ch/SiteCollectionDocuments/systemsx\\_reglement\\_d.pdf](http://www.snf.ch/SiteCollectionDocuments/systemsx_reglement_d.pdf)) will apply:

- a) Scientific relevance and topicality of the proposal
- b) Originality of the questions
- c) Adequacy of the methodology
- d) Scientific track record of the applicants
- e) Expertise of the applicants concerning the proposal
- f) Feasibility of the proposal.

The strategic evaluation by the SEB will be made in due consideration of the Systems Biology approach, its justification, and the significance for SystemsX.ch.

The decision will be based exclusively on scientific criteria. This means that the approved projects **must** (1) add value to Systems Biology and (2) represent high scientific quality. If a substantial part of a RTD-project does not meet these criteria, the whole project will be rejected.

### 3.1.9 Annual Scientific and Financial Reporting

The annual scientific progress report of each RTD Project is to be submitted to the SystemsX.ch Management Office. The reports will be consolidated and passed onto the SNSF where they will be reviewed by the SNSF Panel for Systems Biology.

The financial reports are also to be submitted to the Management Office of SystemsX.ch, the following items must be disclosed according to defined directives (cf. Partnership Agreement Article 38, No. 4):

- SystemsX.ch funds
- Own contributions “in cash” and “in kind” by the involved partners;
- Contributions by the private industry or SME to the SystemsX.ch project;
- Additional third party funds from competitive research foundations (SNSF, CTI, EU, NIH, etc) which support SystemsX.ch.

### 3.2 Interdisciplinary PhD Projects (IPhD)

To support interdisciplinary research and education and to promote the future generation of systems biologists, SystemsX.ch will finance PhD positions for students pursuing research projects that integrate at least two disciplines relevant to Systems Biology. The students will be jointly mentored by investigators from two different disciplines such as computer science, engineering, nanotechnology, physics, mathematics, chemistry, biology, medicine, etc.

**Only one (1) PhD student can be employed per project.** IPhD Projects are limited in time, to three (3) years as a rule and may be extended for one (1) additional year. SystemsX.ch envisages funding up to 40 IPhD students from 2008-2011.

SystemsX.ch will grant the same amount to each IPhD-Project: salary and social charges of the PhD student as set forth in the SNSF rules, a yearly allowance of 10 kFr for consumables and a one-time amount of 2 kFr to cover the costs of participating to an international conference.

The present Call for Proposals will provide funds for up to 12 IPhD Projects. A next call for IPhD proposals will be published in 2009.

#### 3.2.1 Who May Apply for IPhD-Projects?

Faculty members and senior researchers of SystemsX.ch institutions are eligible as main applicants and co-applicants.

Only institutions represented in the Swiss University Conference (SUK/CUS) and the ETH-Domain are eligible to receive SystemsX.ch funding.

#### 3.2.2 Documentation to be Submitted

The IPhD proposals are to be submitted using the official forms consisting of the following parts:

**Part 1:** General Information

**Part 2:** Scientific Information

1. Abstract (1 page)
2. International standing of both applicants in her/his field of research (1 page)
3. Research plan: state of the art, questions, methods, milestones (6-8 pages)
4. Expected impact on capacity building in Systems Biology (1 page)
5. Justification of the Systems Biology approach, significance of the planned research for SystemsX.ch and eventual users (industry, economy, medicine, etc.) (1-2 pages)

Annex:

- CV and publication list over the past 5 years of the two mentors

### 3.2.3 Submission Deadline

The IPhD proposals are to be submitted by **15 January 2009** using the SNSF web platform *mySNF* ([www.snf.ch](http://www.snf.ch)). After the completion of the submission on the web platform, the thereby compiled PDF-file must also be sent to [admin@systemsX.ch](mailto:admin@systemsX.ch).

**Please note:** for SNSF to be able to guarantee *mySNF* access, new user accounts must be requested five working days before a deadline at the latest (from abroad: 2 weeks before the deadline).

It is the applicants' responsibility to ensure timely delivery of their proposal. SNSF and SystemsX.ch reject any responsibility for electronic / e-mail problems or any other problems.

### 3.2.4 SNSF Selection Procedure for IPhD Proposals

The selection of the proposals will be preceded by a formal check by the SNSF administration. Proposals which fail to comply with the formal requirements will not be admitted to the next stage of the selection procedure and will be rejected if the defect cannot be easily remedied. The following formal requirements must be met:

- Compliance with the electronic submission deadline.
- Use of the official forms and completeness of the proposal written in English
- Eligibility of the main and co-applicant.

IPhD proposals will be selected by the Board of the Systems Biology Panel composed of the six members of the National Research Council.

- The Board will assess the proposals against the criteria specified below while taking into account the recommendations of the SEB.
- The SEB will assess the contributions of the submitted proposals to the strategic goals of the SystemsX.ch initiative and forward its recommendation to the SNSF.
- The decisions must be approved by the National Research Council.

### 3.2.5 Selection Criteria

The Board of the Systems Biology Panel will select the IPhD proposals according to the following criteria:

- I. Contribution to the progress of Systems Biology and integration into the overall SystemsX.ch initiative;
- II. Added scientific value due to the interdisciplinarity of the proposal.

In addition to the above mentioned, the standard scientific criteria set forth in the SNSF Rules of Procedure (Reglement über Gesuche SystemsX.ch, 3. Juli 2007) will apply:

- a) Scientific relevance and topicality of the proposal
- b) Originality of the questions
- c) Adequacy of the methodology
- d) Scientific track record of the applicants
- e) Expertise of the applicants concerning the proposal
- f) Feasibility of the proposal.

The Board of the Systems Biology Panel will solicit written external reviews.

The decision will be based on scientific criteria, primarily on (1) added value to Systems Biology and (2) scientific quality.

### 3.2.6 Annual Scientific and Financial Reporting

The annual scientific progress as well as financial reports of each IPhD Project is to be submitted to the SystemsX.ch Management Office. The reports will be consolidated and passed onto the SNSF where they will be reviewed by the SNSF Panel for Systems Biology.

Financial reporting including own contributions from the institutions, third parties will be according to defined directives (cf. Partnership Agreement Article 38, No. 4).

### 3.3 Interdisciplinary Pilot Projects (IPP)

As an emerging field of research, Systems Biology critically depends on new innovative impulses, many of which are expected to come from the interfaces of traditional science disciplines. SystemsX.ch will therefore support IPPs to catalyze the exploration of new research directions and ideas. These projects will bring together research teams from the different disciplines mentioned above to address high risk topics critical for Systems Biology. IPPs will be supported for one (1) year at most and are non-renewable. The funds granted cannot be used to hire PhD students. The applicants can be employed at different SystemsX.ch institutions.

SystemsX.ch will provide funding to IPPs in the amount of up to 120 kFr for personnel (no PhD students), consumables, and equipment. Expenses will be paid directly by the SystemsX.ch Management Office.

The present Call for Proposals will provide funds for up to 8 IPP Projects. A next call for IPP proposals will be published in 2009.

#### 3.3.1 Who May Apply for IPP Projects?

Faculty members and senior researchers of SystemsX.ch institutions are eligible as main applicant.

Only institutions represented in the Swiss University Conference (SUK/CUS) and the ETH-Domain are eligible to receive SystemsX.ch funding.

#### 3.3.2 Information to be Submitted

The IPP proposals are to be submitted using the official form (cf. [IPP Proposal Forms on the SystemsX.ch website](#): General information, budget overview and budget details) that consists of two parts:

**Part 1:** General Information

**Part 2:** Scientific Information

1. Summary (1 page)
2. International standing of the applicant in her/his field of research (1 page)
3. Research plan: state of the art, questions, methods, milestones (3-4 pages)
4. Expected impact on capacity building in Systems Biology (1 page)
5. Justification of the Systems Biology approach, significance of the planned research for the scientific community and eventual users (private industry, economy, medicine, etc.) (1page)

Annex:

CV and publication list over the past 5 years of the main applicant.

### **3.3.3 Submission Deadline**

The IPP proposals are to be submitted by **15 January 2009** in electronic form (PDF) to [admin@systemsx.ch](mailto:admin@systemsx.ch)

It is the applicants' responsibility to ensure timely delivery of the proposal. SystemsX.ch rejects any responsibility for electronic / e-mail problems or any other problems.

### **3.3.4 Selection Criteria**

The Scientific Executive Board (SEB) of SystemsX.ch will evaluate the IPP proposals according to the following criteria:

- Formal criteria (deadline, completeness of the proposal, eligibility of the applicants)
- Focus on clearly defined biological systems and questions
- Does the proposal describe an integrated, interdisciplinary and quantitative project?
- Does the proposal catalyze novel interactions between groups in different fields of Systems Biology?
- Does the proposal generate new data and knowledge that could not be obtained by traditionally structured projects – what is the added value?
- What are the respective contributions of the different disciplines?
- What is the standing of the principal scientists in their respective fields?
- Does the project have a realistic budget and a clear leadership structure?

In addition, the standard scientific criteria will apply:

- a) Scientific relevance and actuality of the proposal
- b) Originality of the goals
- c) Adequacy of the methodology
- d) Scientific track record of the applicants
- e) Expertise of the applicants concerning the proposal
- f) Feasibility of the proposal.

The decision will be based on scientific criteria, primarily on (1) added value to Systems Biology and (2) scientific quality.

### **3.3.5 Scientific and Financial Reporting**

After completion of the IPP project, a scientific and financial report is to be submitted to the SystemsX.ch Management Office and evaluated by the SNSF Systems Biology Panel.

Financial reporting including own contributions from the institutions, third parties will be according to defined directives (cf. Partnership Agreement Article 38, No. 4).

## 4 Appendix: Abbreviations

|         |  |
|---------|--|
| BoD     | Board of Directors (all Presidents and rectors of SystemsX.ch partner institutions)                |
| SEB     | Scientific Executive Board (Scientists of different Systems Biology fields & partner institutions) |
| MO      | SystemsX.ch Management Office  |
| RTD     | Research, Technology and Development Project   |
| IPP     | Interdisciplinary (high risk) Pilot Project  |
| IPhD    | Interdisciplinary PhD Project  |
| SNSF    | Swiss National Science Foundation  |
| SER     | State Secretary for Education and Research   |
| CIT     | Center for Innovative Technology   |
| NIH     | National Institutes of Health  |
| SUK/CUS | Swiss University Conference  |