nano-tera.ch

The Swiss Initiative in

Engineering and information technology for health and security of the human being, and the environment

Call for Proposals

Call for Proposals for Projects within the Framework of *Nano-tera.ch*

In its Message on Education, Research and Innovation for 2008-2011, the Federal Council has proposed to provide funds to the *nano-tera.ch* initiative. Based on the positive decision by the Swiss Parliament, *nano-tera.ch* will support, starting in 2008, a range of projects defined in this call for proposals.

1. What are the broad objectives of *nano-tera.ch* ?

Nano-tera.ch is centered on the research, development and application of micro, nano and information technologies to embedded systems, networks and software to support health, security and environmental monitoring. The broad objectives of the program are both to improve quality of life and security of people across different levels of education, wealth and age and to create innovative products, technologies and manufacturing methods, thus resulting in job and revenue creation.

The intrinsic value of the underlying research is to bridge traditional disciplines, including but not limited to electrical engineering, micro/nano-mechanical systems engineering, biomedical sciences and computer/communication sciences, with the objective of (i) deepening the understanding of enabling technologies and reducing scientific concepts to practice, and (ii) mastering the novel challenges of engineering tera-scale complex systems.

Nano-tera.ch has been established as a “simple partnership”. This legal form enables Universities and Research Centers to meet the above cited synergetic objectives. Indeed, nano-tera.ch provides a neutral platform for collaboration and development of correlated unique competitive technology platforms. The members of the partnership, i.e. the partner institutions[1], as well as future joining members, intend to position Switzerland among the world leaders in these merging fields for Health-Security-Environment Systems Engineering. Nano-tera.ch will enhance and extend interdisciplinary research and education at the highest level to meet these challenges.

2. What are the specific goals of *nano-tera.ch* ?

The *nano-tera.ch* program has several specific goals, such as pursuing excellence in collaborative scientific research in the aforementioned disciplines, creating and expanding educational programs, constructing demonstrators of the technologies being studied and transferring the results to Swiss industry.

To achieve its research objectives, the nano-tera.ch program covers two major strategic axes:

- Research and development of advanced technologies, such as i) micro/nano-electronics, -electromechanical systems (MEMS/NEMS) and -manufacturing proc-

[1] Presently EPF Lausanne, ETH Zürich, University of Neuchatel, University of Basel, University of Svizzera Italiana, CSEM

- esses; ii) (bio)-sensors, actuators and their system-level integration; iii) information and communication sciences as well as systems and software engineering.
- Integration of these technologies into application fields, such as wearable systems (e.g., for monitoring of patients, sportsmen, and the elderly), ambient systems (e.g., for environmental intelligence, building monitoring and virtual world) and remote systems (e.g., space applications such as pico-satellites, remote sensing).

The *nano-tera.ch* program is organized in the matrix-like structure depicted below in Figure 1. The five vertical technology axes intersect the three horizontal application fields. This space defines areas of cross-disciplinary research targeted towards the overall program objectives, which are systems for health, security and the environment. Typical projects are collaborative efforts, i.e. integrated projects with different investigators and each integrated project having to aim at matching several boxes of the matrix in Figure 1

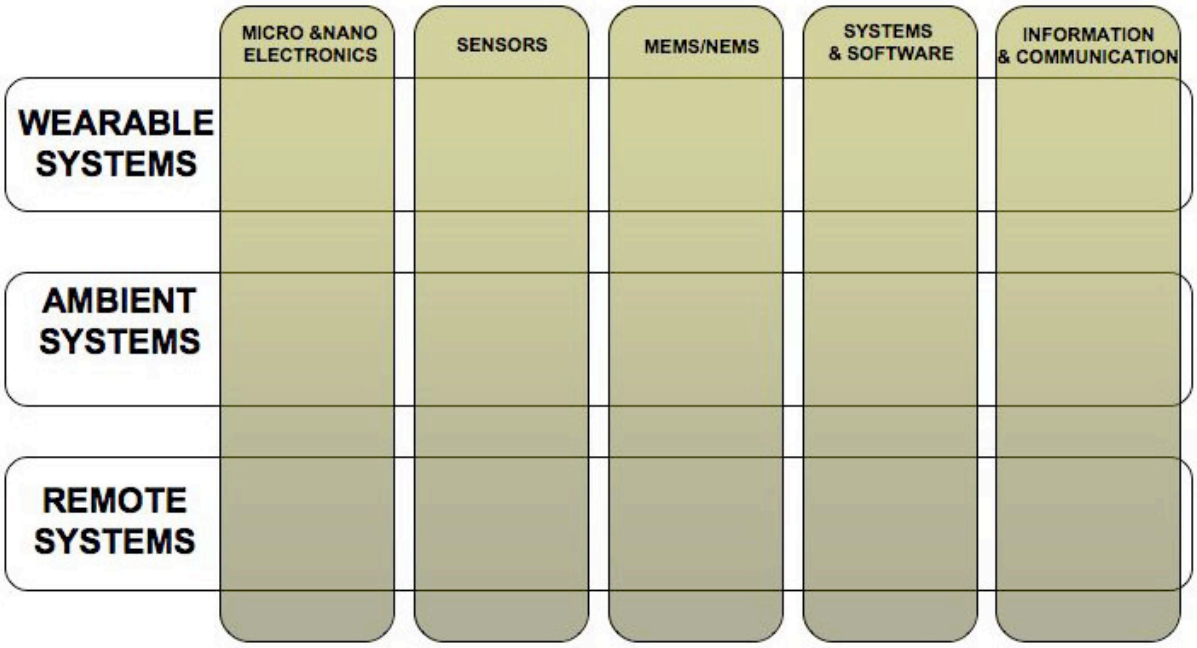

Figure 1. nano-tera.ch program structure

The *nano-tera.ch* program has several characteristics, which make it different from other research funding programs, namely:

- Engineering of complex (tera) systems out of small (nano/micro) components, by leveraging scientific and technological discoveries, with the objective of developing technology demonstrators that can be transformed into products in the medium term.

- Synergy of various disciplines through well-coordinated research efforts, to explore topics at the boundary of traditional scientific domains.

- Collaborative nature and significant funding size of the average research projects (and specifically RTDs – see below) which would not be otherwise available through usual channels (e.g. SNSF projects).

- Social relevance, in terms of projected benefits to health, security and the environment.

2.1 General Information

General information about *nano-tera.ch* is available at URL: www.nano-tera.ch . Please contact the *nano-tera.ch* office if you have any questions.

Prof. Giovanni De Micheli Program Leader and Chair, Executive Committee EPFL – INF 341 Station 14 CH 1015 Lausanne Tel: +41 21 693 09 12 Fax: +41 21 693 09 09	Dr. Peter Bradley Executive Director EPFL – INF 330 Station 14 CH 1015 Lausanne Tel: +41 21 693 81 62 Fax: +41 21 693 09 09 peter.bradley@nano-tera.ch

3. Types of *nano-tera.ch* Projects

The *nano-tera.ch* program will support different types of activities, namely:

Research, Technology and Development (RTD) projects
Nano-Tera Focused (NTF) projects
Education and Dissemination (ED) activities

Most of the nano-tera.ch funding will be devoted to RTDs, which are integrated research projects of collaborative and interdisciplinary nature, as described in Section 3.1. Submitted proposals for RTD projects will be evaluated by an international review panel of the *Swiss National Science Foundation* (SNSF) and by the *Executive Committee* (EXCOM) of *nano-tera.ch*. NTFs are small-scale projects with a limited budget and lifespan, which serve the purpose of addressing specific tasks and needs that are deemed important by the EXCOM, as detailed in Section 3.2. ED activities are an important component of nano-tera.ch, as described in Section 3.3. Both NTF and ED activities will be funded based on proposals submitted to and evaluated by the *nano-tera.ch* EXCOM.

Research, Technology and Development Projects (RTD Projects)

RTD projects are integrated research projects. Major characteristics of these projects are interdisciplinary and cooperation among research groups, preferably from different institutions, as well as the formation of doctoral students. Within one project, several research groups of complementary fields will contribute to reach the main project goals. RTD projects can focus either on the in-depth study of a particular vertical technology (as shown in Figure 1), and/or on the development and implementation of a horizontal application area. A *nano-tera.ch* RTD project is to be proposed and led by one main applicant, the *Principal Investigator* (PI). The PI's institution, the so-called *hosting institution* of the RTD Project, will be re-

sponsible for the administration, coordination and reporting of the project. The PI will manage the project during proposal writing, and once it is approved, he/she ensures that it is carried to completion in all its aspects including reporting.

3.1.1 Duration, Finances

The expected duration of RTD projects is **4 years**, with a global budget up to **7 MCHF** per project, including matching funds. As required by the University Law, Article 13, and in accordance with the Message of the Federal Council on Education, Research and Innovation, for the years 2008-2011, participating institutions must provide matching funds (in cash and/or in kind).

Three sources of finance are expected to support *nano-tera.ch* projects:

A) *nano-tera.ch* funds.

B) in-kind contributions of the participating institutions.

C) cash contributions obtained from third parties.

A) *nano-tera.ch* funds

Financial support from *nano-tera.ch* to a given RTD project will be no greater than 50% of the total cost of that project. Matching funds B) and C) are therefore expected for all funded RTD projects.

B) Matching funds in the form of in-kind contributions

1. Personnel

Direct cost attributed to personnel paid from the institution's operating budget is counted as in-kind contribution of that institution. It is summarized below (salaries and social charges):

- Full/associate professor 250 kF/year (max. 20%)
- Assistant professor 180 kF/year
- Senior researcher 150 kF/year
- PostDoc 120 kF/year
- Technician 120 kF/year
- PhD-Student 61 kF/year

2. Equipment

Requests to include existing equipment or infrastructure as in-kind contributions will be examined and decided upon by the EXCOM case by case. In its assessments, the EXCOM will adopt commonly applied depreciation rates and determine *pro rata* the amount eligible.

3. Other contributions

Other planned expenses, directly linked with the project will be considered for in-kind contributions. They include notably consumables and services present at each institution that will be applied to the project, with the adequate rate of dedication and use.

C) Matching funds in the form of cash contributions

Cash contributions include all financial support obtained from sources different from *nano-tera.ch*. This additional financial support may include competitive, funding from

SNSF, CTI, EU, other funding agencies in Switzerland and abroad, as well as from industrial partners (large companies and SMEs). While this additional financial support is expected, it is not a mandatory condition to submit a proposal for an RTD project

Cash funds secured to support accepted *nano-tera.ch* projects are to be reported in the annual accounting statements of the corresponding institutions.

Proposals for RTD projects must be submitted on the *nano-tera.ch* application forms provided by the SNSF. Each proposal will present a detailed budget with both requested resources and secured matching funds.

The present call makes available a total amount of about 25 MCHF for funding a number of RTD projects over a period of four years, starting in the summer of 2008. A second similar call for RTD proposals will be published in one year, for projects starting in the summer of 2009.

3.1.2 Letter of Intent

In order to assist the applicants, *nano-tera.ch* offers to check an outline of the proposal before it is fully elaborated. A letter of intent at most 4 pages long, describing the main objectives, research methods and technologies, their rationale and expected impact, as well as the involved research groups and the tentative budget, must be sent electronically to the *nano-tera.ch* Executive Director by **February 28, 2008**, in PDF form. An informal feedback will be given by the beginning of March 2008. This process is not part of the evaluation.

3.1.3 Who May Apply for RTD Projects?

Faculty members of the nano-tera.ch partnership as well as of others Swiss Universities and of institutions of the ETH-Domain (presently not being members of the nano-tera.ch partnership) are eligible as Principal Investigators. After approval by the SNSF and prior to initiation of funding each qualified RTD's hosting institute must become full nano-tera.ch partner.

Faculty members and senior researchers of Swiss Universities, of both Polytechnics, of institutions of the ETH-Domain, of Swiss Universities of applied sciences as well as of public and private research institutions outside the academia are eligible as Co-Investigators. In the case of private research institutions eligibility for *nano-tera.ch* funding is regulated by Article 7 Paragraph 4 of the revised Research Law (see Message for Education, Research and Innovation 2008-2011, German version p. 1448).

3.1.4 Documentation to be Submitted

The RTD proposals are to be submitted using the official form (cf. RTD Proposal Form) that consists of two 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 (max 15 pages in total).
   - 3.1. Overall research questions, framework of the whole project, research approach and partition into tasks, task assignment to research groups, with GANTT chart showing collaboration and exchange among groups), expected added value (max 5 pages).
   - 3.2. Research plan of each task: state of the art, questions, methods, milestones and deliverables (max 2 pages for each task, GANTT chart).

4. Significance of the planned research for *nano-tera.ch* and eventual users (private industry, economy, health and public sector, etc.) (max 2 pages).

Annexes:

- Four-year budget according to instructions under 3.1.1.
- Letters of commitment of the participating institutions (cf. Commitment Form).
- Curriculum and list of the 10 most relevant publications of all applicants.
- Existing contracts, letters of support of existing or potential industry partners if applicable.

3.1.5 Submission Deadline

The RTD proposals are to be submitted by May 1st, 2008 both:

1. Swiss National Science Foundation
   nano-tera.ch
   Wildhainweg 3
   P.O. Box
   3001 Bern

and

2. electronically (in PDF format) to both of the following addresses:
   nano-tera.ch@[illegible]ch and admin@nano-tera.ch

It is the applicants' responsibility to ensure timely delivery of their proposal. SNSF and *nano-tera.ch* reject any responsibility for (electronic) mail delivery problems.

3.1.6 Selection Procedure for RTD Proposals

The selection of the proposals will be preceded by a formal check by the SNSF administration. Proposals that 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 deficiency 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 principal investigator and the co-applicant(s).
- Firm commitment of the participating hosting institution, when using large facilities and/or institutional equipment.
- Required cash/in kind contribution.

Proposals will be evaluated by the *nano-tera.ch* Panel appointed by the SNSF, consisting of international experts in fields of engineering relevant to *nano-tera.ch*, and by the *nano-tera.ch* EXCOM. Each RTD project proposal will be evaluated according to two major principles:

- The scientific quality of the proposal.
- The strategic importance of the proposed research as a means to achieve the overall program's objectives.

The outcome of both evaluations can be either positive or negative. In the case of two positive evaluations, the project will be approved and funded immediately subject to the available budget. If the project proposal is deemed to have strategic importance, but it is considered technically deficient, the P.I. will be allowed to revise the proposal and submit it for another evaluation.

3.1.7 Evaluation Criteria

RTD proposals will be evaluated according to the following criteria listed here in an unsorted order:

1. Contribution to the state of the art in the field and impact.
2. Scientific quality of the proposal.
3. Originality.
4. Adequacy of the methodology.
5. Scientific track record of the applicants in the area of the proposal.
6. Feasibility, organization and financial planning of the proposal.
7. Integration into the overall nano-tera.ch vision (www.nano-tera.ch), matching several boxes of the matrix in figure 1.
8. Relevance of the proposal toward extending the state of the art in the nano-tera.ch domains.
9. Significant and genuine collaborative effort and synergy of the participants and corresponding budget.
10. Feasibility of the project in terms of delivering realizations of the proposed results within the nano-tera.ch program lifespan.
11. Industrial interest in the research via financial and/or technical contribution or in creating prototypes of the technology
12. Differentiation of the proposed activities as compared to other funded programs.

The nano-tera.ch SNSF panel will evaluate the RTD proposals according to their scientific quality. The nano-tera.ch EXCOM will evaluate the proposal based on their strategic importance to fulfill the overall nano-tera.ch goals. See also the document: Regulations of *nano-tera.ch.*

Both SNSF panel and EXCOM may resort to external review for some or all RTD proposals.

3.1.8 Annual Reporting

The annual scientific progress report of each RTD Project is to be submitted to the *nano-tera.ch* Management Office (cf. *nano-tera.ch* Ordinary Partnership Contract, Article 30.4). The report is evaluated by the SNSF *nano-tera.ch* Panel and by the EXCOM. The financial report to the Management Office of *nano-tera.ch* should present the use of the resources applied to the project, namely:

- *nano-tera.ch* funds.
- Own contributions “in cash” and “in kind” by the involved partners.
- Industrial contributions to the *nano-tera.ch* project.
- Additional third party funds from competitive research foundations (SNSF, CTI, EU, NIH, etc), which support *nano-tera.ch*.

Financial reporting will be according to defined directives (cf. *nano-tera.ch* Ordinary Partnership Contract, Art. 37.4)

3.2 Nano-tera.ch Focused Projects (NTF)

NTF projects embody activities that the EXCOM deems important. The EXCOM will fund them based on simplified review procedure. These projects are small-scale focused projects to address specific scientific/technical issues and needs. Examples include, but are not lim-

ited to, activities collateral to RTDs, activities that are in-between the scope of two RTDs (glue projects) and activities that promote technology transfer. Funds can be used to support doctoral and post-doctoral students as well as technicians and engineers, with the understanding that funds are granted on an annual basis.

The contour of each NTF project will determine its duration, expected to be typically **1 year**. *Nano-tera.ch* funding in the amount of up to approximately 100 kCHF/year is decided by the EXCOM and provided directly by the Management Office. It will cover direct expenses for personnel, consumables and small equipment.

The overall budget for the NTFs is 500kCHF/year, and thus only a very limited number of such projects can be supported.

There is no specific deadline for the NTF project proposals. The nano-tera.ch EXCOM will review NTF projects directly, possibly with the help of *ad hoc* experts.

3.2.1 Who May propose NTF Projects?

Applications can be submitted by faculty members and senior scientists of Swiss Universities, of both Polytechnics and the institutions of the ETH-Domain, of Swiss Universities of applied sciences as well as of public and private research institutions outside the academia. In the case of private research institutions eligibility for *nano-tera.ch* funding is regulated by Article 7 Paragraph 4 of the revised Research Law (see Message for Education, Research and Innovation 2008-2011, German version p. 1448).

3.2.2 Information to be Submitted

The PI must submit a proposal (cf. NTF proposal form) containing the following 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 (1 page).
5. Justification of the proposal within the context of other RTDs, significance of the planned research for the scientific community and eventual users (private industry, economy, health and public sector, etc.) (1page).

Annex:

- Curriculum and list of the 10 most relevant publications of all applicants.

3.2.3 Selection Criteria

The EXCOM of *nano-tera.ch* will evaluate the NTF proposals according to the following criteria:

- Formal criteria (completeness of the proposal, eligibility of the applicants).
- Focus on clearly defined scientific and technological problems.
- Does the proposal catalyze novel interactions between groups in different fields?
- Does the proposal generate new data and knowledge that could not be obtained by RTD projects – what is the added value?
- Does the proposal support technology transfer to industry and to enhance the impact of nano-tera.ch.
- What is the standing of the principal scientists in their respective fields?
- Does the project have a realistic budget and a clear leadership structure?

3.2.4 Reporting

After completion of the NTF project, a scientific report is to be submitted to the *nano-tera.ch* Management Office. Financial reporting including own contributions from the institutions, third parties will be according to defined directives (cf. *nano-tera.ch* Ordinary Partnership Contract, Article 37.4).

3.3 Education and Dissemination Activities (ED)

Education and Dissemination of results is an integral part of *nano-tera.ch*. Proposals may be submitted to support short courses, workshops, mini-conferences, as well as developing new curricula. The focus on educational activities is to fill the gap of programs that are not currently provided by Swiss Universities and Polytechnics. Proposals may address the in-depth study of a vertical technology and/or interdisciplinary horizontal activities as shown in Figure 1. An annual budget of 100kCHF is made available to support ED activities in 2008, out of a total projected expenditure of 1.5MCHF over a 4-year period. Normally, the budget of ED activities is limited to 50kCHF for event.

3.3.1 Who May Apply for ED Activities?

Applications can be submitted by faculty members and senior scientists of Swiss Universities, of both Polytechnics and of institutions of the ETH-Domain, of Swiss Universities of applied sciences as well as of public and private research institutions outside the academia. In the case of private research institutions eligibility for *nano-tera.ch* funding is regulated by Article 7 Paragraph 4 of the revised Research Law (see Message for Education, Research and Innovation 2008-2011, German version p. 1448). In the case of proposals for developing new curricula, public and private research institutions are only eligible as co-applicants.

3.3.2 Documentation to be Submitted

The ED proposals are to be submitted using the official form (cf. ED Proposal Form) that consists of two parts:

Part 1: General Information

Part 2: Scientific Information

1. Summary (1 page).
2. International standing of applicant in her/his field of research (1 page).
3. Education plan: state of the art, added value (3-4 pages).
4. Expected impact (1 page).

Annex:

- Curriculum and list of the 10 most relevant publications of all applicants.

3.3.3 Submission Deadline

Proposals can be submitted twice a year (May 1st and November 1st) in electronic form (pdf) to:
admin@nano-tera.ch

It is the applicants' responsibility to ensure timely delivery of their proposal. SNSF and *nano-tera.ch* reject any responsibility for (electronic) mail delivery problems

3.3.4 Selection Criteria

The EXCOM of *nano-tera.ch* will evaluate the ED proposals according to the following criteria:

- Formal criteria (deadline, completeness of the proposal, eligibility of the applicants).
- Focus on clearly defined scientific and technological problems.
- Sound education and/or dissemination plan.
- Novelty and possibly uniqueness of the ED plan.
- What is the standing of the principal scientists in their respective fields?
- Does the project have a realistic budget and a clear leadership structure?

3.3.5 Reporting

After completion of the ED project, a scientific report is to be submitted to the *nano-tera.ch* Management Office. Financial reporting including contributions from the institutions and from third parties will be according to defined directives (cf. *nano-tera.ch* Ordinary Partnership Contract, Article 37.4).