



# Guide2009

National Centres of Competence in Research



# **Guide**2009

National Centres of Competence in Research

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# National Centres of Competence in Research (NCCRs)

## Goals and Implementation

In the year 2001 the Swiss National Science Foundation launched the National Centres of Competence in Research (NCCR). The main goal of the currently 20 NCCRs is the promotion of scientific excellence in areas of major strategic importance for the future of Swiss research, economy and society. NCCRs are managed by leading houses institutionally linked to universities or other distinguished research institutions (home institutions). In addition to the research teams at the home institution, an NCCR sets up a network of other research teams across Switzerland. The maximum duration of an NCCR is 12 years. The three underlying principles of NCCRs are:

- **Research:** NCCRs carry out research of excellent quality, spanning basic research to applications. There is a number of individual projects doing the actual research work in each NCCR. The NCCR director ensures the coherence and integration of the individual projects.
- **Knowledge and technology transfer:** NCCRs develop links with the potential users of their results, and involve them in project planning from the outset.
- **Training and promotion of women:** NCCRs create the necessary structures and implement measures required to train young scientists (doctoral and postdoctoral students). Particular attention is paid to the advancement of women in research.

From a research policy point of view, NCCRs should contribute to a better structuring of the Swiss research environment, and to optimised task assignment between research institutions.

NCCRs are funded by the Swiss National Science Foundation (SNSF), participating institutions - in particular the home institution - and third parties. The 20 existing NCCRs receive a total of CHF 250 million in SNSF funding for 2005 - 2008.

Calls for submissions to set up NCCRs were first made in January 1999. Priority was given to four areas of research: life sciences, social sciences and humanities, sustainable development and environment, and information and communication technologies. A share of the overall budget was also made available to projects involving promising topics from outside these priority areas. The SNSF assessed the projects in two stages: a pre-proposal stage, with 82 projects submitted, and a full-proposal stage, with 34 submissions. The SNSF presented 18 full proposals of outstanding merit to the Federal Department of Home Affairs, which made the final selection of 14 NCCRs according to federal research policy in December 2000.

A second call for NCCRs in the field of Social Sciences and Humanities was launched in October 2003. After a thorough evaluation of 44 pre-proposals and 17 full proposals 6 new NCCRs started in autumn 2005.

Within the SNSF, Division IV of the National Research Council is responsible for NCCRs. An international Review Panel is set up for each NCCR to assess its progress regularly.

# The NCCRs at a glance

## 1<sup>st</sup> Call of NCCRs

Short Name	NCCR-Director	Home Institution	Web Address
Climate	Prof. Stocker Thomas	University of Berne	www.nccr-climate.unibe.ch
CO-ME	Prof. Székely Gábor	ETH Zurich	co-me.ch
FINRISK	Prof. Gibson Rajna	University of Zurich	www.nccr-finrisk.unizh.ch
Genetics	Prof. Duboule Denis	University of Geneva	www.frontiers-in-genetics.org
IM2	Prof. Bourlard Hervé	Idiap Research Institute, Martigny	www.im2.ch
MaNEP	Prof. Fischer Øystein	University of Geneva	www.manep.ch
MICS	Prof. Aberer Karl	EPF Lausanne	www.mics.org
Molecular Oncology	Prof. Aguet Michel	ISREC Epalinges	www.nccr-oncology.ch
Nanoscale Science	Prof. Schönenberger Christian	University of Basel	www.nccr-nano.org
Neuro	Prof. Schwab Martin	University of Zurich	www.nccr-neuro.unizh.ch
North-South	Prof. Hurni Hans	University of Berne	www.north-south.unibe.ch
Plant Survival	Prof. Turlings Ted	University of Neuchâtel	www.unine.ch/plantsurvival
Quantum Photonics	Prof. Devaud-Plédran Benoît	EPF Lausanne	nccr-qp.epfl.ch
Structural Biology	Prof. Grütter Markus	University of Zurich	www.structuralbiology.unizh.ch

## 2<sup>nd</sup> Call of NCCRs

Short Name	NCCR-Director	Home Institution	Web Address
Affective Sciences	Prof. Scherer Klaus	University of Geneva	www.affective-sciences.org www.sciences-affectives.ch
Democracy	Prof. Kriesi Hanspeter	University of Zurich	www.nccr-democracy.unizh.ch
Iconic Criticism	Prof. Boehm Gottfried	University of Basel	www.eikones.ch
Mediality	Prof. Kiening Christian	University of Zurich	www.mediality.ch
SESAM	Prof. Margraf Jürgen	University of Basel	www.sesamswiss.ch
Trade Regulation	Prof. Cottier Thomas	University of Berne	www.nccr-trade.ch

## Output in 2001 - 2004

(1<sup>st</sup> Call of NCCRs)

Type	Number
Scientific papers	7 100
Presentations at congresses and fairs	6 700
Patents/licences	126
Start up companies <sup>1</sup>	17
Prototypes, demonstrators, processes	131
Cooperations with private and public sector	338
CTI projects <sup>2</sup>	28 <sup>3</sup>

<sup>1</sup> Built up or encouraged by the NCCRs

<sup>2</sup> CTI: Innovation Promotion Agency of the Swiss Government funding cooperation projects with industry

<sup>3</sup> The total amount of the 28 projects is about CHF 31.7 Mio.

## Total of funds in 2001 - 2004

(1<sup>st</sup> Call of NCCRs)

Funding source (CHF)	2001	2002	2003	2004	Total	%
SNSF funding	51 034 237	57 303 066	58 114 035	57 607 320	224 058 658	37
Self-funding from home institutions <sup>1</sup>	18 685 602	20 762 660	19 157 137	19 722 980	78 328 379	13
Self-funding from project participants	39 364 540	51 884 528	64 851 723	69 156 289	225 257 080	37
Third-party funding <sup>2</sup>	8 861 639	16 620 401	27 986 869	29 546 417	83 015 326	13
Total	117 946 018	146 570 655	170 109 764	176 033 006	610 659 443	100

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. above)

## Total of persons involved in 2001 - 2004

(1<sup>st</sup> Call of NCCRs)

Personnel	Total of Persons	Female	%	Male	%	Swiss	Other Nations
Management	50 <sup>1</sup>	86	44	111	56	141	80
Master students	172	83	48	89	52	80	98
Doctoral students	1 310	359	27	951	73	523	829
Postdoctoral students	654	161	25	493	75	161	505
Research associates	97	29	30	68	70	49	49
Senior researchers <sup>2</sup>	1 172	199	17	973	83	523	704
Other staff	758	398	53	360	47	471	297
<b>Total</b>	<b>4 213</b>	<b>1 315</b>	<b>30</b>	<b>3 045</b>	<b>70</b>	<b>1 948</b>	<b>2 562</b>

<sup>1</sup> Fulltime equivalent, including all NCCR-Directors, and persons in charge of knowledge and technology transfer, and education and training

<sup>2</sup> Including leaders of the individual projects and other organisational units of the NCCRs

## Total of funds in 2005 - 2008

(1<sup>st</sup> and 2<sup>nd</sup> Call of NCCRs)

Funding source (CHF)	2005	2006	2007	2008	Total	%
SNSF funding	66 955 000	65 567 000	63 341 000	61 537 000	257 400 000	35
Self-funding from home institutions <sup>1</sup>	21 117 710	23 852 187	22 725 242	26 198 486	93 893 625	13
Self-funding from other institutions <sup>2</sup>	6 095 240	5 677 322	5 153 897	4 729 639	21 656 098	3
Self-funding from project participants	68 003 946	72 138 404	65 352 264	60 880 145	266 374 759	36
Third-party funding <sup>3</sup>	30 212 890	20 912 240	22 998 884	19 017 270	93 141 284	13
<b>Total</b>	<b>192 384 786</b>	<b>188 147 153</b>	<b>179 571 287</b>	<b>172 362 540</b>	<b>732 465 766</b>	<b>100</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> See the NCCRs Molecular Oncology, Neuro and Structural Biology

<sup>3</sup> Not included is CTI funding (cf. page 6 and some NCCRs)

## Total of persons involved in the NCCRs in the last reporting period (12 months)

(1<sup>st</sup> and 2<sup>nd</sup> Call of NCCRs)

Personnel	Total of Persons	Female	%	Male	%	Swiss	Other Nations
Management	94 <sup>1</sup>	113	43	150	57	161	140
Master students	148	83	56	65	44	89	57
Doctoral students	1264	436	34	828	66	464	846
Postdoctoral students	569	163	29	406	71	117	470
Research associates	223	95	43	128	57	97	131
Senior researchers <sup>2</sup>	1175	215	18	960	82	522	782
Other staff	590	324	55	266	45	391	209
<b>Total</b>	<b>4063</b>	<b>1429</b>	<b>34</b>	<b>2803</b>	<b>66</b>	<b>1841</b>	<b>2635</b>

<sup>1</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>2</sup> Including leaders of the individual projects and other organisational units of the NCCRs

# Molecular Oncology – From Basic Research to Therapeutic Approaches

## NCCR Molecular Oncology

### Home Institution

EPFL, Lausanne

### Start of the NCCR

May 1, 2001

### NCCR Management

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Vania Sergy, Mrs.

#### Knowledge and

Technology Transfer  
Aguet Michel, Prof.

#### Education and Training

Deka Jürgen, Dr.

#### Advancement of Women

Brisken Cathrin, Dr.

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Case postale  
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nccr.oncology@epfl.ch

### Web Address

www.nccr-oncology.ch

### Public Relations

- Newsletter NCCR
- News and press coverage on website
- Press releases

### Tumor Host Interactions - Research

#### Cell Signaling in Tumor Development and Metastasis

Signaling pathways important in breast cancer and breast development

Head: Brisken C.

Mechanisms controlling tissue homeostasis and their role in cancerogenesis

H: Hülsken J.

#### The role of the tumor stroma

H: Stamenkovic I.

Apoptosis-inducing MegaFasL as novel anti-tumor agent

H: Tschopp J.

Study of gene networks implied in cancer biology

H: Naef F.

### Gene Expression Signatures in Tumors

Gene expression signatures in human glioblastoma and their implications for tumor biology and treatment of cancer

H: Hegi M.

Microarray analysis of breast cancer

H: Iggo R.

### Heads of Individual Research Projects

Aguet Michel, Prof.

Beermann Friedrich, Dr.

Brisken Cathrin, Prof.

Christofori Gerhard, Prof.

Delorenzi Mauro, Dr.

Garin Nathalie, Dr.

Hegi Monika, Dr.

Hülsken Jörg, Prof.

Iggo Richard, Prof.

Kraehenbuhl Jean-Pierre, Prof.

Leyvraz Serge, Prof.

Michielin Olivier, Prof.

### Tumor Angiogenesis

Role of COX-2 and inflammatory cells in tumor angiogenesis and tumor progression

H: Rüegg C.

Unraveling the molecular regulation of tumor lymphangiogenesis and lymph node metastasis

H: Christofori G.

### Tumor Immunity and Cancer Immunotherapy

Coordinator: Romero P.

T cell vaccination of cancer patients and cellular analysis of T cell responses

H: Speiser D.

Combining T cell vaccination with adoptive-cell-transfer (ACT) immunotherapy

H: Leyvraz S.

Molecular analysis of T cell immune responses

H: Rufer N.

Structural design of peptide/MHC and T cell > receptor interactions

H: Michielin O.

### Technology Development and Support

Bioinformatics core facility

H: Delorenzi M.

Mouse facility

H: Beermann F.

Microscopy, imaging & morphology facility

H: Garin N.

Clinical tumor proteome analysis facility

H: Servis C.

### Education

Oncology Online: Development of a web-based oncology teaching program

H: Kraehenbuhl J.-P.

## Topics

Cancer cells are defective in basic processes controlling cell differentiation and proliferation, genome stability and programmed cell death. They acquire capacities to invade tissues, to stimulate angiogenesis, and to elicit innate and in some instances specific immune responses. The Swiss Institute for Experimental Cancer Research (ISREC) forms together with several partner institutes (Ludwig Institute for Cancer Research, Department of Biochemistry of the University of Lausanne, Swiss Institute of Bioinformatics) part of a biomedical research center in Epalinges near Lausanne. The research focuses on different aspects

of basic tumor biology and the host response to cancer. Work at ISREC centers on the discovery of genes that play important roles in tumorigenesis, using genetic approaches in unicellular and multicellular organisms. A major project at the Department of Biochemistry of the University of Lausanne investigates the ways that permit tumor cells to evade programmed cell death. Other groups in the ISREC and the Ludwig Institute for Cancer Research elucidate the mechanisms that control immune responses to cancer. Research projects in external institutes and clinics, also in other parts of Switzerland, complement

the research portfolio of this cancer research program.

The projects carried out in Epalinges form a basis for the design of novel approaches to cancer therapy, and the NCCR program provides us with the means to explore such prospects, through cooperation with our partners in different University hospitals. The NCCR is also essential for supporting technology development and core facilities necessary for such clinically oriented research. Finally, the program provides training opportunities for MD/PhDs to foster the development of translational oncology in Switzerland.

## Third Party Cooperation

(in progress)

### Programmes

- Vital - IT
- ACGT (FP6)
- EORTC + RTOG
- EORTC
- TRANS-BIG (FP6)
- TuMIC (FP7)

### Research Institutions

- Bute Medical School, University of St Andrews, Edinburgh, GB
- Cancer Research Institute, New York, US
- Centre Médical Universitaire de Genève, CH
- Department of Biochemistry, University of North Carolina, US
- Department of Diagnostic Radiology, CHUV, Lausanne, CH
- Department of Growth Control, Friedrich Miescher Institute, Basel, CH
- Department of Immunology and Oncology, University of Madrid, ES
- Department of Neurosurgery, Anderson Cancer Center, University of Texas, Houston, US
- Department of Signal Processing, EPFL, Lausanne, CH
- Department of Surgical Oncology, Erasmus University Hospital, Rotterdam, NL
- ETH-IMSB, Zürich, CH
- Instituto de Investigaciones Biomedicas, CSIC-UAM, Madrid, ES
- Laboratory of Physical Chemistry, ETHZ, Zürich, CH
- Molecular Cancer Biology Laboratory, University of Helsinki, FI
- National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health (NIH), Bethesda, US
- Oncology Institute of Southern Switzerland, Bellinzona, CH
- San Francisco Department of Public Health, University of California, San Francisco (UCSF), US
- Service de dermatologie et vénéréologie, Centre Hospitalier Universitaire Vaudois (CHUV), Lausanne, CH

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Stamenkovic Ivan, Prof.

Centre Hospitalier Universitaire Vaudois, CHUV, Lausanne

Tschopp Jürg, Prof.

Department of Biochemistry, University of Lausanne

### Partner Institutions

Ludwig Institute for Cancer Research LICR, Lausanne Branch

Department of Biochemistry of the University of Lausanne DB, UNIL

Swiss Institute of Bioinformatics SIB, Lausanne Branch

Centre Pluridisciplinaire d'Oncologie CePO

Centre Hospitalier Universitaire Vaudois CHUV

## Members of the Advisory Board

Tumor-Host Interaction and Apoptosis

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Rommelaere Jean, Prof.

Deutsches Krebsforschungszentrum DKFZ, Heidelberg, DE

DNA-Microarrays, Bioinformatics and Tumor Specific Gene Expression

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European Molecular Biology Laboratory EMBL, Heidelberg, DE

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University of Cambridge, GB

Guha Abhijit, Prof.

University of Toronto, CA

Liu Edison, Prof.

Genome Institute of Singapore, SG

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Netherlands Cancer Institute NKI, Amsterdam, NL

Immunotherapy

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University of Seattle & Fred Hutchinson Cancer Research Center, US

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Leiden University, NL

#### Economy / Industry

- Agilent Technologies, Inc., Palo Alto, US
- Animatrix GmbH, Basel, CH
- Apoxis SA, Lausanne, CH
- AstraZeneca (UK) Ltd, London, GB
- Bracco Research SA, Geneva, CH
- BTG International Ltd., London, GB
- Diagnoplex Sàrl, Epalinges, CH
- Eli Lilly and Company, Indianapolis, US
- Ipsogen SAS, Marseille, FR
- Merck KGaA, Darmstadt, DE
- Novartis AG, Basel, CH
- Novartis Pharma AG, Basel, CH
- OncoMethylome Sciences, Inc., Durham, US
- Pfizer AG, Zurich, CH
- Pfizer, Inc., New London, US
- Roche AG, Basel, CH
- Smart Nose Ltd, Neuchâtel, CH
- Xigen SA, Lausanne, CH

#### Others

- Association pour la recherche sur le Cancer (ARC), Villejuif, FR
- European School of Oncology, Milan, IT
- Fond' Action contre le Cancer, Lausanne, CH
- Fondation Barletta, Lausanne, CH
- Fondation Widmer c/o Dept. Médecine Interne, Hôpital Universitaire de Genève, CH
- Fonds de neurochirurgie, Geneva, CH
- Gebert Rûf Stiftung, Basel, CH
- HIV Vaccine Trials Network, Seattle, US
- Ligue Suisse contre le Cancer, Bern, CH
- Medic Foundation, Geneva, CH
- OncoSuisse, Bern, CH
- Swiss Group for Clinical Cancer Research (SAKK), Berne, CH

## Achievements

### New spirit

The NCCR has created a new spirit of greater mutual interest across the borders between basic and clinical research. Several collaborative projects involving scientists at ISREC and more clinically oriented research groups at the University Hospital Lausanne (CHUV) and other Swiss university clinics have been started. Some of these projects include partnerships with pharmaceutical companies (e.g. Pfizer).

### New insights

Novel molecular events underlying the development of certain tumour types have been elucidated. Cell types from which these tumours arise have been identified. Mechanisms, which control cell division and the degree of specialization of normal cells have been unravelled and may prove relevant for malignant tumour progression. New models to investigate the development of tumour metastases in distant organs have been established. These discoveries provide a basis for the identification and validation of novel therapeutic approaches.

### New therapeutic developments

A clinical study has been completed to investigate how tumours control their blood supply. A further clinical trial is currently

underway to assess the efficacy of anti-angiogenic therapy in patients with head and neck tumours. Novel strategies have been developed to direct the patient's immune system against the tumour. Immunisation of melanoma patients with tumour derived antigens proved to be successful in eliciting a strong tumour specific immune response.

A vaccine against papillomaviruses has been developed as treatment against cervix carcinomas, which in a vast majority are associated with papillomavirus infections. The vaccine has been proven to be safe and is currently being tested in patients.

The pattern of differentially regulated genes has been analysed in several human tumour types (breast, brain, skin). Results from such studies allowed identifying new tumour subtypes and in some cases new prognostic markers. They may eventually lead to the identification of gene profiles, which are predictive of a response to therapy.

### New research groups

Five new positions for junior research group leaders equivalent to assistant professorships have been created to strengthen advanced biocomputing and research that is directly cancer relevant.

### New technologies

The NCCR Molecular Oncology allowed to establish or strengthen important technology platforms. The animal facility allowed the development of novel cancer mouse models, which mimic the genetic alterations and the behavior of human tumours and are indispensable for the validation of new therapeutic targets. The DNA array and bioinformatics core facilities supported several novel cancer relevant projects at the interface to the clinic.

### Training

The NCCR Molecular Oncology provides education and training in cancer research at several levels. It participates and strengthens the ISREC International PhD Programme and the MD/PhD programme of the University of Lausanne, providing medical doctors with an opportunity to carry out a PhD thesis in molecular oncology. The NCCR presently supports the training of approximately 30 PhD students and 30 postdoctoral fellows. NCCR advanced courses in microscopy, imaging and morphology have been carried out by the NCCR imaging facility (MIM) for users including students from the University of Lausanne and the EPFL.

Further information see [www.nccr-oncology.ch](http://www.nccr-oncology.ch)

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	3 750 000	3 750 000	3 750 000	3 750 000	15 000 000	36
Self-funding from home institution <sup>1</sup>	2 120 852	2 226 935	1 491 686	1 058 319	6 897 792	17
Self-funding from project participants	3 614 847	3 012 917	2 651 382	2 362 364	11 641 510	28
Third-party funding <sup>2</sup>	1 609 891	2 168 496	2 316 519	2 137 793	8 232 699	20
<b>Total</b>	<b>11 095 590</b>	<b>11 158 348</b>	<b>10 209 587</b>	<b>9 308 476</b>	<b>41 772 001</b>	<b>100</b>

Personnel <sup>3</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							FR	IT	DE	CA	BE	
Management	3.81	1	8	11	92	7	0	0	1	0	2	4
Master students	3	2	67	1	33	3	0	1	0	0	0	0
Doctoral students	30	14	47	16	53	14	3	2	1	2	0	10
Postdoctoral students	32	16	50	16	50	6	11	4	2	2	0	8
Research associates	4	3	75	1	25	0	1	1	1	0	0	1
Senior researchers <sup>4</sup>	48	14	29	34	71	29	5	4	4	1	1	11
Other staff	35	21	60	14	40	23	3	1	0	0	1	8
<b>Total</b>	<b>155.81</b>	<b>71</b>	<b>43</b>	<b>93</b>	<b>57</b>	<b>82</b>	<b>23</b>	<b>13</b>	<b>9</b>	<b>5</b>	<b>4</b>	<b>42</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 1 project has been funded by CTI at a total amount of 1.1 million CHF.

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

### Members of the Review Panel

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# Frontiers in Genetics – Genes, Chromosomes and Development

## NCCR Genetics

### Home Institution

University of Geneva

### Start of the NCCR

July 1, 2001

### NCCR Management

#### Director

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#### Office Secretary

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### Web Address

[www.frontiers-in-genetics.org](http://www.frontiers-in-genetics.org)

### Public Relations

- Pole Position Newsletter
- Leaflets (English, French or German)
- Press releases, news and adverts on website
- Public events (open doors, teaching, training, exhibitions)
- Meetings

### Research

#### Work Packages

**Novel approaches to study mammalian genetics and develop animal models of human diseases**

Coordinator: Trono D.

Members: Antonarakis S., Duboule D., Schibler U., Trono D., Wahli W.

**Functional genomics based on PhiC31 integrase; Integrase-mediated germ-line transformation of drosophila and design of shuttle systems in the mouse**

Coordinator: Basler K.

Members: Basler K., Hafen E., Karch F.

**Chromosome structure and nuclear dynamics**

Coordinator: Shore D.

Members: Gasser S., Laemmli U., Lingner J., Shore D., Stutz F.

**Genetic and viral mapping of neural circuits**

Coordinators:

Arber S., Rodriguez I.

Members: Arber S., Rodriguez I., Roska B.

**Energy homeostasis and size control: from physiology to pathology**

Coordinator: Wahli W.

Members: Hafen E., Schibler U., Wahli W., Herrera P., Nef S., Thorens B.

**Pilot project Stem cells and regeneration**

Coordinator: Herrera P.

Members: Grapin-Botton A., Nef S., Ruiz i Altaba A., Gaillot B.

### Technological Platforms, Programs etc.

**Genomics platform (Genotyping and transcriptome profiling)**

Manager: Descombes P.

**Bioimaging platform (Image analysis)**

Manager: Bauer C.

**Mammalian genetics platform**

H: Duboule D.

**Doctoral School**

Supervisors: Suarez Mougli, Dr. Rodriguez I.

## Topics

The general goal of the NCCR Frontiers in Genetics – Genes, Chromosomes and Development is to understand the function and regulation of genes during the development of cells and organisms. These fundamental problems are tackled at four different levels, namely at the level of genes, of chromosomes, of the whole cell and of the entire organism. In order to reach excellence in this domain, it is necessary to bridge the gaps between

these levels. The NCCR Genetics contributes to diminish these gaps by creating a network of scientists, which work together on common projects (organized as Work-Packages, WP). These WPs provide an ideal forum for the in-depth discussion of scientific issues by all interested persons (including post-doctoral fellows and students). Some projects directly related to technological development are pursued in

the context of our technological platforms. These platforms are shared common facilities in which the latest technologies in Genomics and Bioimaging are available for the regional scientific community. Another major goal is to offer the best graduate school in genetics. We believe that to pursue top science, we need to attract the best students worldwide and “create” the next generation of top scientists by teaching.

## Third Party Cooperation

(in progress)

### Programmes

- EuroDYNA
- NEURONE

### Research Institutions

- Biological Sciences - Neurobiology, Columbia University, New York, US
- Biomolecular Screening Facility, EPFL, Lausanne, CH
- Brain Research Institute, ETHZ, Zurich, CH
- Clinic of Endocrinology and Diabetes, Dept. of Medicine, University Hospital Zurich, CH
- Dép. de Physiologie Cellulaire et Métabolisme, Fac. Médecine, University of Geneva, CH
- Dép. Médecine Interne, Université de Genève, CH
- Dept. Head of Developmental Biology, Hagedorn Research Institute, Gentofte, DK
- Dept. of Biochemistry and Molecular Biology, University of Georgia, Athens, GR
- Dept. of Biochemistry, Erasmus University Medical Center, Rotterdam, NL
- Dept. of Cell Biology, Nara Institute of Science and Technology, Nara, JP
- Dept. of Cell Physiology and Metabolism, University Medical Center, Geneva, CH
- Dept. of Developmental Biology, University of Texas Southwestern, Dallas, US
- Dept. of Genetic Medicine and Development, University Medical Center Geneva, CH
- Dept. of Genetics and Microbiology, University of Pavia, IT
- Dept. of Physiology, University of Lausanne, CH
- Diabetes Research Center, Free University, Brussels, BE
- EMBL, Developmental Biology Unit, Heidelberg, DE
- Gene Expression and Regulation Program, Wistar Institute, Philadelphia, US
- Hadassah Med. School, Hebrew University, Jerusalem, IL
- INSERM, Unité Inserm 625, Rennes, FR

## Heads of Individual Research Projects

Antonarakis Stylianos E., Prof.  
Arber Silvia, Prof.  
Basler Konrad, Prof.  
Duboule Denis, Prof.

Galliot Brigitte, MER  
Gasser Susan M., Prof.  
Grapin-Botton Anne  
Hafen Ernst, Prof.  
Herrera Pedro, Dr.  
Karch François, Dr.

Laemmli Ulrich K., Prof.

Lingner Joachim, Dr.  
Nef Serge, Dr.  
Rodriguez Ivan, Prof.

Roska Botond, Dr.  
Ruiz i Altaba Ariel, Prof.  
Schibler Ueli, Prof.  
Shore David M., Prof.  
Spierer Pierre, Prof.

Stutz Françoise, Dr.  
Thorens Bernard, Prof.  
Trono Didier, Prof.  
Wahli Walter, Prof.

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Departement für Zellbiologie, Universität Basel  
Institut für Molekularbiologie, Universität Zürich  
Département de Zoologie et Biologie Animale, Université de Genève

Département de Zoologie et Biologie Animale, Université de Genève  
Friedrich Miescher Institute for Biomedical Research, Basel  
ISREC, Epalinges

Institut für Zoologie, Universität Zürich  
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Département de Zoologie et Biologie Animale, Université de Genève

Départements de Biologie Moléculaire et Biochimie, Université de Genève  
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Département de Morphologie, Université de Genève  
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Département de Biologie Moléculaire, Université de Genève  
Département de Zoologie et Biologie Animale, Université de Genève

Département de Biologie Cellulaire, Université de Genève  
Centre Intégréatif de Génomique, Université de Lausanne  
Ecole Polytechnique Fédérale de Lausanne  
Centre Intégréatif de Génomique, Université de Lausanne

- Inst. of Biochemistry, ETHZ, Zurich, CH
- Inst. of Veterinary Biochemistry and Molecular Biology, University of Zurich, CH
- Ludwig Institute of Cancer Research, University of Lausanne, CH
- Max Planck Institute for Biophysical Chemistry, Göttingen, DE
- Max Planck Institute for Molecular Biology, Munich, DE
- Molecular Physiology & Biophysics, Vanderbilt University, Nashville, US
- Muséum National d'Histoire Naturelle, Paris, FR
- Neurodegenerative Studies Laboratory, EPFL, Lausanne, CH
- Oncologie et biologie du développement, ISREC-EPFL, Lausanne, CH
- Pathologies nutritionnelles et métaboliques. Centre de recherche des Cordeliers, IFR58, Paris, FR
- School of Life Sciences, ISREC-EPFL, Lausanne, CH
- Southwestern Medical Center, University of Texas, Dallas, US
- Technical Research Centre of Finland (VTT), Helsinki, FI
- The Jackson Laboratory, University of Massachusetts, Bar Harbour, US
- Unité d'Endocrinologie et Métabolisme, Catholic University of Louvain, Brussels, BE

#### Economy / Industry

- Debiopharm S.A., Lausanne, CH
- Evolva AG, Allschwil, CH
- Leica Microsystems, Glattbrugg, CH
- Nestlé Research Center, Vevey, CH
- Novartis S.A., Basel, CH
- Sanofi-Aventis SA, Paris, FR

#### Other

- NCCR FG members, Geneva, CH

## Achievements

### Research and technology

In addition to the five research programs (Work Packages) already implemented, a pilot project entitled “stem cells and re-generation” has been developed this past year. The knowledge resulting from this multidisciplinary project will be useful for devising cell-based replacement therapies and will contribute to unravelling the mechanisms of tumour cell spreading.

The research carried out by the 20 laboratories and organised into Work Packages has resulted in maintaining, or even increasing, the leading position of Switzerland in genetics at the international level. During this past year, 20 of the scientific articles produced were published in the top “high impact” journals and four prizes were awarded to Frontiers in Genetics members. The cutting edge research done within the NCCR has had an unprecedented impact on our University, which has declared genetics a priority domain.

NCCR members are the key players in the creation of a new institute named IGe3 (Institut de Génétique et Génomique de Genève). This structure, re-

sulting from collaboration between the Science and Medical Faculties of the University of Geneva, will allow completing the process of Frontiers in Genetics' integration within an institutional context.

The five platforms set up during the past years continue to be very well attended by the academic community and private sector, due to excellent expertise and a low “cost/quality” ratio. This concerns the genomics and bioimaging platforms, located in Geneva, the lentivirus and the mouse metabolic evaluation (MEF) platforms in Lausanne, as well as the site-specific integration system for high-throughput germ line transformation of *Drosophila*, in Zurich.

### Education

The International Doctoral School developed by our NCCR, which has gained four new students in 2008, comprises to date 32 students of different nationalities.

The first four students of the program have graduated in 2007 and another five are expected to achieve the same feat in 2008. The NCCR students all prove to be excellent and highly motivated scientist.

One of the major goals of Frontiers in Genetics, which is to recruit and form tomorrow's top scientists, continues to be sustained through an excellent training program. A constant dialogue with the professors and students ensures that the School features are adapted to their needs.

### Public relations

One of our main objectives is to communicate with the public. A new section, «Genetics for All», has been created on our web site. Lay summaries of all of the Work Packages were inserted on the site and scientific publications of interest have been translated into lay terms and posted in an attractive form.

Emphasis was put on the NCCR's participation to public manifestations such as La Nuit de la Science, Les Journées de la Génétique, La Science appelle les jeunes. Interviews related to these events were broadcasted on various radio channels.

Frontiers in Genetics has also resumed its collaboration with the TV channel TSR by leading the forum 300 questions à un biologiste.

Further information see [www.frontiers-in-genetics.org](http://www.frontiers-in-genetics.org)

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	4 100 000	4 100 000	4 000 000	3 800 000	16 000 000	36
Self-funding from home institution <sup>1</sup>	479 274	558 178	500 000	500 000	2 037 452	5
Self-funding from project participants	5 274 801	5 122 966	5 264 281	4 892 205	20 554 253	47
Third-party funding	1 369 893	1 032 422	1 508 327	1 642 403	5 553 045	13
<b>Total</b>	<b>11 223 968</b>	<b>10 813 566</b>	<b>11 272 608</b>	<b>10 834 608</b>	<b>44 144 750</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							FR	IT	US	DE	GB	
Management	4.84	4	40	6	60	10	2	0	7	0	0	0
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	66	24	36	42	64	25	9	9	2	7	5	19
Postdoctoral students	49	15	31	34	69	5	11	4	2	2	2	24
Research associates	2	2	100	0	0	0	2	0	0	0	0	0
Senior researchers <sup>4</sup>	32	8	25	24	75	21	9	0	2	2	0	9
Other staff	50	37	74	13	26	27	12	3	0	1	0	6
<b>Total</b>	<b>203.84</b>	<b>90</b>	<b>43</b>	<b>119</b>	<b>57</b>	<b>88</b>	<b>45</b>	<b>16</b>	<b>13</b>	<b>12</b>	<b>7</b>	<b>58</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>3</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>4</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

### Members of the Review Panel

Kléber André, Prof. (Chair)  
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# Molecular Life Sciences – Three Dimensional Structure, Folding and Interactions

## NCCR Structural Biology

### Home Institution

University of Zurich

### Start of the NCCR

May 1, 2001

### NCCR Management

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### Public Relations

- Leaflet
- Homepage / eNewsletter
- Newspaper articles
- Appearance on radio and national TV

### Research

#### Areas

Structural biology  
of membrane proteins  
Coordinator: Engel A.

Supramolecular  
assemblies/molecular  
interactions  
Coordinator: Richmond T. J.

#### Technologies

Coordinator: Plückthun A.

#### Projects

Folding and function  
of supramolecular systems  
and membrane proteins  
Head: Glockshuber R.

Synthetic protein libraries  
H: Plückthun A.

Assessing the structure  
and dynamics of membrane  
proteins by electron  
and atomic force microscopy  
H: Engel A.

X-ray crystallography of  
supramolecular systems and  
membrane transporters  
H: Grütter M.

Supramolecular assemblies:  
structures of chromatin  
and associated multiprotein  
complexes  
H: Richmond T. J.

Signalling and transport  
through biological mem-  
branes  
H: Winkler F.

Solution NMR with soluble  
and membrane proteins,  
including supramolecular  
structures  
H: Wüthrich K.

Computer simulation of  
membrane proteins,  
supramolecular complexes  
and macromolecular folding  
H: van Gunsteren W. F.

X-ray crystallography and  
electron microscopy of  
supramolecular systems  
H: Ban N.

Structure determination of  
protein-RNA complexes in-  
volved in alternative-splicing  
by NMR spectroscopy  
H: Allain F.

Mechanisms of ion transport  
across membranes:  
The structural biology of ion  
channels and ion transporters  
H: Dutzler R.

Structure and mechanism  
of bacterial drug and  
antibiotic transporters  
H: Locher K.

Single molecule spectroscopy  
of cotranslational protein fold-  
ing, structure, and dynamics  
H: Schuler B.

### Associated Groups

Automation of protein  
crystallography beamlines  
for challenging projects  
at the swiss light source  
H: Schulze-Briese C.

New isotope labeling  
strategies of protein and  
RNA for NMR spectroscopy  
investigations  
H: Wüthrich K.

Calorimetric and biophysical  
analysis of protein-ligand  
binding and protein folding  
H: Jelezarov I.

Technical development for  
automated and high-through-  
put data collection and 3D  
reconstruction in electron  
microscopy  
H: Ishikawa T.

### Programmes

PhD program Biomolecular  
structure and mechanism  
Supervisor: Allain F.

Annual practical course  
in structural biology  
Supervisor: Glockshuber R.

Annual symposium on new  
trends in structural biology  
Supervisor: Glockshuber R.

## Topics

Today, knowledge about biological processes is obtained from functional experiments on a limited number of biochemical systems, and from a rapidly increasing amount of DNA sequence information, generated in several genome projects. To bridge the widening gap between rapidly increasing information on genome sequences and limited knowledge on the function of gene

products, a quantitative understanding of the 3D-structure of proteins, their folding, and their interactions with other molecules is required. Such understanding is the key to develop innovative medicines, such as new antibiotics and vaccines, as well as drugs against cancer and diseases of the central nervous, immune, and cardiovascular systems. In this NCCR

specialists in experimental structure determination by X-ray crystallography, NMR spectroscopy and electron microscopy / crystallography, in protein biophysical chemistry, modern molecular biology, and computational biology will meet the challenge to link the ever increasing biological data generated in the genomics field with related structural and functional information.

## Third Party Cooperation

### Research Institutions

- Biotechnologisches Zentrum der Technischen Universität Dresden (BIOTEC), Dresden, DE
- Center for Structural Biology, Vanderbilt University, Nashville, US
- Chemical Biology and Nuclear Science Division (CBND), Lawrence Livermore National Laboratory, Livermore, US
- Dép. de microbiologie fondamentale, Université de Lausanne, CH
- Dept. of Biochemistry, Duke University, Chapel Hill, US
- Dept. of Biochemistry, University of Groningen, NL
- Dept. of Biochemistry, University of Washington, Seattle, US
- Dept. of Biology, University of Science and Technology of China, Hefei, CN
- Dept. of Biophysical Chemistry, Biozentrum at the University of Basel, CH
- Dept. of Biophysical Chemistry, University of Groningen, NL
- Dept. of Biophysical Structural Chemistry, Leiden Inst. of Chemistry, Leiden University, NL
- Dept. of Biophysics, Kyoto University, JP
- Dept. of Microbiology, University of Regensburg, DE
- Dept. of Molecular Biology & Biotechnology, University of Sheffield, Firth Court, GB
- Dept. of Molecular Biophysics and Biochemistry, Yale University, New Haven, US
- Dept. of Molecular Microbiology, John Innes Centre, Norwich, GB
- Dept. of Pharmacochemistry, Free University of Amsterdam, NL
- Dept. of Pharmacology, Case Western Reserve University, Cleveland, US
- Dept. of Physics, University of California (UCLA), Santa Barbara, US
- Dept. of Plant Biochemistry, Lund University, Lund, SE
- Dept. of Structural Biology, Max Planck Inst. of Biophysics (MPI), Frankfurt, DE
- Division of Chemistry and Chemical Engineering, California Inst. of Technology (Caltech), Pasadena, US
- Division of Microbiology, Biozentrum, University of Basel, CH
- Division of Molecular and Health Technologies, Commonwealth Scientific and Industrial Research Org., Melbourne, AU
- Fachhochschule beider Basel (FHBB), Basel, CH
- Fachhochschule Zürich, Wädenswil Winterthur, CH

## Heads of Individual Research Projects and Associated Groups

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Ban Nenad, Prof.  
Dutzler Raimund, Prof.  
Engel Andreas, Prof.  
Glockshuber Rudolf, Prof.  
Grütter Markus, Prof.  
Ishikawa Takashi, Dr.  
Jelezarov Ilian, Dr.  
Locher Kaspar, Prof.  
Plückthun Andreas, Prof.  
Richmond Timothy J., Prof.  
Schuler Ben, Prof.  
Schulze-Briese Clemens, Dr.  
van Gunsteren Wilfred F., Prof.  
Winkler Fritz, Prof.  
Wüthrich Kurt, Prof.

Institut für Molekularbiologie und Biophysik, ETH Zürich  
Institut für Molekularbiologie und Biophysik, ETH Zürich  
Institut für Biochemie, Universität Zürich  
M.E. Müller Institut, Biozentrum, Universität Basel  
Institut für Molekularbiologie und Biophysik, ETH Zürich  
Institut für Biochemie, Universität Zürich  
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Institut für Biochemie, Universität Zürich  
Paul Scherrer Institut, Villigen PSI  
Laboratorium für physikalische Chemie, ETH Zürich  
Paul Scherrer Institut, Villigen PSI  
Institut für Molekularbiologie und Biophysik, ETH Zürich

## Molecular Life Sciences – Three Dimensional Structure, Folding and Interactions NCCR Structural Biology

- Faculté de biologie et de médecine, Université de Lausanne, CH
- Faculty of Sciences, Dept. of Organic Chemistry and Biochemistry, University of Zagreb, HR
- Howard Hughes Medical Inst., University of California Los Angeles, Los Angeles, US
- Inst. de Biologie Moléculaire et Cellulaire (IBMC), CNRS, Strasbourg, FR
- Inst. de Génétique et de Biologie Moléculaire et Cellulaire (IGBMC), Dép. de Neurobiologie et Génétique, Illkirch, FR
- Inst. für Biochemie und Medizinische Molekularbiologie, Friedrich-Alexander-Universität Erlangen-Nürnberg, DE
- Inst. for Biotechnology, ETH Zurich, CH
- Inst. for Microbiology, ETH Zurich, CH
- Inst. for Molecular Bioscience, University of Queensland, Brisbane, AU
- Inst. of Biophysical Chemistry Resonance, Johann Wolfgang Goethe-University of Frankfurt, DE
- Inst. of Biotechnology and Biomedicine, University of Barcelona, ES
- Inst. of Botany, Darmstadt University of Technology, Darmstadt, DE
- Inst. of Cellular and Molecular Medicine, University of Copenhagen, DK
- Inst. of Medical Chemistry, Medical University of Vienna, AT
- Inst. of Membrane and Systems Biology, University of Leeds, GB
- Inst. of Microbiology, ETH Zurich, CH
- Inst. of Molecular Pediatric Science, University of Chicago, US
- Inst. of Organic Chemistry, ETH Zurich, CH
- Inst. of Physiology, University of Zurich, CH
- Laboratoire de Maturation des ARN et Enzymologie Moléculaire, Vandoeuvre-les-Nancy, FR
- Laboratory for Surface Science and Technology, ETH Zurich, CH
- Laboratory of Food Microbiology, ETH Zurich, CH
- Laboratory of Molecular Biology, National Inst. of Health (NIH), Bethesda, US
- M. D. Anderson Cancer Center, University of Texas, Houston, US
- Max Planck Inst. for Polymer Research, Mainz, DE
- Max Planck Inst. of Coal Research, Mülheim, DE
- Max-Planck-Inst. for Biophysical Chemistry, Goettingen, DE

### Achievements

#### Key biology areas

This NCCR focuses on the structural biology of membrane proteins and supramolecular complexes and interactions. In both areas, major advances could be reported since the start of this NCCR. Methods for cloning, expression, purification, crystallisation and analysis of membrane proteins could be advanced and successes in the structure determination of membrane proteins were achieved. A recent breakthrough in this field is the structure determination of three ABC transporters. Another highlight was the structure determination of a prokaryotic pentameric ligand gated ion channel that serves as a bacterial homologue to the eukaryotic nicotinic acetylcholine receptors. The structures of several supramolecular complexes were determined. Important research fields in this area include the chromatin structure, the ribosome, RNA-protein interactions and fatty acid syntheses.

#### Technology platforms

Shared infrastructure units for recombinant protein production, stable isotope-labelling of proteins and high-throughput crystallisation of proteins for NMR or X-ray studies have been established and are today a major tool for effective structure determination used by many research groups within or outside this NCCR. A successful collaboration with the SLS-synchrotron for high-throughput crystal analysis and protein structure determination complements these technology platforms.

#### Technology Transfer

Project leaders of this NCCR have various individual collaborations with industry partners. An umbrella-type agreement for long-term collaboration between Novartis and the NCCR has been realized, so far leading to two collaborations. The spin-off company Molecular Partners resulted partly from the NCCR research project on 'ankyrin repeats' which are an alternative to antibodies

as selective binders. Another spin-off, REDbiotec, commercialises MultiBac, a novel expression tool for large eukaryotic multiprotein complexes.

#### Education

A post-graduate program in structural biology was established and embedded in the Life Science Zurich Graduate School. Thanks to the synergies within this NCCR, a very broad and in-depth education of students in structural biology became possible.

This NCCR established a series of well-recognized structural biology events, namely a yearly symposium and practical courses that are well attended by scientists from within the NCCR and from other research institutes.

#### Structural Effects

This NCCR offers an excellent opportunity for interdisciplinary and high-standard structural biology research in Switzerland which allowed to attract several outstanding young scientists to Switzerland.

Further information see [www.structuralbiology.uzh.ch](http://www.structuralbiology.uzh.ch)

- Medizinische Biochemie und Molekularbiologie der Universität des Saarlandes, Homburg, DE
- Molecular and Structural Biochemistry, University of Rennes, FR
- Organic Chemistry, ETH Zurich, CH
- San Diego Joint Center for Structural Genomics, US
- School of Medical Sciences, University of Aberdeen, GB
- Swiss Light Source (SLS), Paul Scherrer Inst., Villigen, CH
- The Scripps Research Inst., La Jolla, US
- Theoretical Molecular Biophysics Group, Max Planck Inst. for Biophysical Chemistry, Göttingen, DE
- Unité de Génétique moléculaire, Inst. Pasteur, Paris, FR
- Zentrum für Molekular-biologie der Pflanzen (ZMBP), Universität Tuebingen, DE
- Zentrum für Molekulare Biologie (ZMBH), Universität Heidelberg, DE

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	3 900 000	3 800 000	3 400 000	3 300 000	14 400 000	34
Self-funding from home institution <sup>1</sup>	955 801	1 368 021	1 700 235	3 477 004	7 501 061	18
Self-funding from ETH Zurich	980 393	1 164 405	1 002 515	867 275	4 014 588	9
Self-funding from project participants	4 820 225	4 729 873	4 941 086	1 080 880	15 572 064	37
Third-party funding <sup>2</sup>	800 000	250 260	50 000	50 000	1 150 260	3
<b>Total</b>	<b>11 456 419</b>	<b>11 312 559</b>	<b>11 093 836</b>	<b>8 775 159</b>	<b>42 637 973</b>	<b>100</b>

Personnel <sup>3</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	FR	NL	IT	HR	
Management	2.93	2	20	8	80	5	2	1	1	0	0	1
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	76	26	34	50	66	27	24	2	1	2	3	18
Postdoctoral students	56	13	23	43	77	16	10	5	5	3	2	17
Research associates	0	0	0	0	0	0	0	0	0	0	0	0
Senior researchers <sup>5</sup>	46	8	17	38	83	12	12	5	2	1	1	14
Other staff	25	17	68	8	32	14	2	1	0	1	0	10
<b>Total</b>	<b>205.93</b>	<b>66</b>	<b>31</b>	<b>147</b>	<b>69</b>	<b>74</b>	<b>50</b>	<b>14</b>	<b>9</b>	<b>7</b>	<b>6</b>	<b>60</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 1 project has been funded by CTI at a total amount of 1.7 million CHF.

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

### Economy / Industry

- Actelion Pharmaceuticals Ltd., Allschwil, CH
- Apotech Corporation, Lausen, CH
- BioXtal, Epalinges, CH
- Bruker AXS GmbH, Karlsruhe, DE
- Cambridge Antibody Technology, Cambridge, GB
- F. Hoffmann-La Roche Ltd., Basel, CH
- Greiner Bio-One GmbH, Frickenhausen, DE
- Molecular Partners AG, Zurich, CH
- MorphoSys AG, Martinsried, DE
- NEXUS Biosystems, Inc., San Diego, US
- Novartis Pharma AG, Basel, CH
- Novartis Pharma AG, Boston, US
- Polyphor Ltd., Allschwil, CH
- Roche Pharma (Schweiz) AG, Basel, CH
- SIKA AG, Zürich, CH
- Speedel Experimenta AG, Allschwil, CH

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

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Wright Peter E., Prof.

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# Neural Plasticity and Repair

## NCCR Neuro

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### Start of the NCCR

June 1, 2001

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#### Knowledge and

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#### Education and Training

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#### Advancement of Women

Mansuy Isabelle, Prof.

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### Web Address

www.nccr-neuro.uzh.ch

### Public Relations

- Neurotransmitter Newsletter
- BrainFair 2009

### Research

#### Neural stem cells: An integrated approach to basic knowledge and therapeutic applications

Head: Suter U.  
Fritschy J.-M., Jessberger S.,  
Lipp H.-P., Raineteau O.,  
Relvas J., Sommer L.,  
Thallmair M.

#### Alzheimer's disease

H: Nitsch R.  
Caflich A., Fraering P.,  
Glockshuber R., Hock C.,  
Knüsel I., Konietzko U.,  
Mansuy I., Molinari M.,  
Sonderegger P.

#### Acute-phase predictors and modulators for long-term out- come after stroke

H: Luft A.  
Wegener S.

#### Immunotherapy for malignant glioma

H: Weller M.  
Aguzzi A., Bertalanffy H.,  
Eisele G., Frei K., Roth P.

#### Cortical plasticity

H: Martin K.  
Boesiger P., Helmchen F.,  
Ishai A., Jäncke L., Kiper D.,  
Scherberger H., Singer T.,  
Stephan K.E.

#### Infection and immunity of the central nervous system

H: Fontana A.  
Aguzzi A., Becher B.,  
Dreano M., Goebels N.,  
Kappos L., Reith W., Suter T.

#### Spinal cord repair

H: Schwab M., Dietz V.,  
Courtine G., Curt A., Kollias S.,  
Micera S., Mir A., Rouiller E.,  
Schurch B., Sonderegger P.,  
Stoeckli E., Zurn A.

#### Rehabilitation technology matrix

H: Riener R.  
Bassetti C., Gassert R.,  
Kiper D., Kollias S., Micera S.,  
Schwab M.

### Technological Platforms, Programmes etc.

#### Center of transgenesis expertise

H: Mansuy I.  
Aguzzi A., Becher B.,  
Jessberger S., Helmchen F.,  
Suter U.

#### Center for advanced assessment of animal behavior

H: Lipp H.-P.  
Feldon J., Wolfer D.,  
Zeilhofer H.U.

#### Center for proteomics

H: Wollscheid B.

#### Center for animal imaging

H: Rudin M.  
Helmchen F., Zeilhofer H.U.

#### International Ph. D. Program in Neuroscience

Administered by the  
Neuroscience Center Zurich  
Coordinator: Knecht W.

## Topics

Today there is still little that can be done to help the victims of brain damage or other kinds of diseases that afflict the brain or spinal cord. Only since the beginning of the 1980's research has been devoted to repairing brain trauma or disease. But at the same time, great strides have been made in the understanding of disease mechanisms and the possibilities of restoring neural functions. It is said that neuroscience made more progress in the last

ten years than in the whole of last century.

The fundamental goal of the NCCR on "Neural Plasticity and Repair" is the restoration of function after damage or disease of the nervous system. The NCCR will elucidate the basic cellular and molecular mechanisms of regeneration, plasticity and functional repair of the damaged nervous system. The synergies between experimental and clinical sciences in conjunction with engi-

neering sciences, neuroinformatics and brain imaging will generate new knowledge on the impairment and repair of brain functions, in particular in Alzheimer's disease, multiple sclerosis, prion disease, immune surveillance and in neuronal regeneration and rehabilitation after spinal cord injury. Indeed, the first clinical trials have been initiated to assess the immunotherapy of spinal cord injury.

## Third Party Cooperation

(in progress)

### Programme

- CORTEX
- EUCLOCK (FP6)
- INTELLIMAZE (FP6)
- MIMICS (FP7)
- NeuroNE (FP6)
- NEURONET (ESPRIT 4)
- NOVELTUNE (FP6)
- RATstream (FP6)
- SCOPES (IB74B0-111081)
- SystemsX

### Research Institutions

- Abteilung Neurologie, Landeskrankenhaus Hochzirl, Hochzirl, AT
- Alexander Silberman Inst. of Life Sciences, Hebrew University, Jerusalem, IL
- Biomedical Research Inst., LeHasselt University, Diepenbeek, BE
- Center for Brain and Behavior and Psychiatry and Behavioral Sciences, Baylor College of Medicine, Houston, US
- Center for Medical Science, International University of Health and Welfare, Ohtawara, JP
- Center for Molecular Biology and Neuroscience, University of Oslo, NO
- Center for Neural Science, Korea Inst. of Science and Technology, Seoul, KR
- Center for Neurobiology and Behavior, Columbia University, New York, US
- Centre for Neuroscience Research, University of Edinburgh, GB
- CNRS UMR 7102, Université Paris, FR
- Dept. de Technologia, Universitat Pompeu Fabra, Barcelona, ES
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- Dept. of Anatomical Sciences & Neurobiology, University of Louisville, School of Medicine, Louisville, US
- Dept. of Anatomy and Developmental Biology, University College London, GB
- Dept. of Anatomy and Neurobiology, Chandler Medical Center, University of Kentucky, Lexington, US
- Dept. of Anatomy and Neurobiology, University of California, Irvine, US
- Dept. of Anatomy, University of Witwatersrand, Johannesburg, ZA
- Dept. of Cell Physiology and Pharmacology, University of Leicester, GB
- Dept. of Cellular Neurology, Hertie-Inst. for Clinical Brain Research, University of Tübingen, DE
- Dept. of Chronobiology, University of Groningen, Haren, NL
- Dept. of Cognitive Neuroscience, Faculty of Psychology, Maastricht University, NL
- Dept. of Computer Science, University College London, GB

## Heads of Individual Research Projects and Subprojects

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Curt Armin, Prof.  
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Dietz Volker, Prof.  
Eisele Günter, Dr.  
Feldon Joram, Prof.  
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Biochemisches Institut, Universität Zürich  
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# Neural Plasticity and Repair

## NCCR Neuro

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Sonderegger Peter, Prof.  
Stephan Klaas Enno, Prof.  
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Suter Tobias, Dr.  
Suter Ulrich, Prof.  
Thallmair Michaela, Dr.  
Valavanis Anton, Prof.  
Wegener Susanne, Dr.  
Weller Michael, Prof.  
Wolfer David, Prof.  
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Zeilhofer Hanns Ulrich, Prof.

Zurn Anne, Dr.

### Delegates

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Mansuy Isabelle, Prof.  
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Institut für Hirnforschung, Universität Zürich  
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## Achievements

The power of neuroscience has been brought to bear on the understanding of the diseases of the brain and spinal cord and the possibility of restoring neural functions. The NCCR Neuro has achieved major milestones in translating basic neuroscience into therapy since its beginning in 2001. The collaboration between experimental and clinical neuroscience has been further strengthened and extended to include neuroinformatics, brain imaging and engineering sciences.

### Therapeutic advances

Immunotherapy has reached the clinical stage in the treatment of spinal cord injury and NCCR groups are participating in the first clinical trials. Similarly, the stage is set for clinical trials of immunotherapy for Alzheimer's disease. Devices from rehabilitation engineering are in clinical use.

### Basic science

Basic neuroscience has been strongly promoted to follow new avenues in stem cell research and neural differentiation as well as in the process of rehabilitation of the injured CNS.

### Recognition

The achievements of the NCCR were recognized by a large number of internationally and nationally prestigious prizes awarded to members of the NCCR Neuro.

### New professorships

To advance the NCCR, eight new professorships were created since the beginning: one each in clinical and experimental analysis of multiple sclerosis, two in rehabilitation engineering, one in animal brain imaging, one in stem cell biology, and one each in experimental and clinical neurorehabilitation.

### Central facilities

A core structure provides methodological support for the diverse projects of the NCCR. This facility consists of four integrative units. The center of transgenesis expertise and the center of behavioral assessment were complemented by a center dedicated to animal imaging and a center on systems proteomics.

### Education

The Neuroscience Center Zurich (ZNZ) offers the International Ph.D. Program in Neuroscience. About 90 Ph.D. students of the NCCR Neuro are currently enrolled in this program.

### Spin offs

Major efforts have been made to extend joint projects with major pharma companies. In addition, two spin-off companies arose from the NCCR and provide new positions for young scientists: NewBehavior AG in Zurich („Intellicage“) and Neurimmune Therapeutics AG in Zurich. Thirty-three patents have been issued.

### Dialogue with society

The dialogue between the NCCR and society at large is an important aspect. Regular press contacts are organized. The BrainFair Zürich attracts thousands of visitors each year. An informative and balanced communication with the public is essential for our work.

### Outlook

Based on the past achievements, the NCCR will continue to promote basic science, provide new insights into disease mechanisms and advance therapies for injuries and disorders of the CNS.

Further information see [www.nccr-neuro.uzh.ch](http://www.nccr-neuro.uzh.ch)

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- Lab. of Genetics, The Salk Inst. for Biological Studies, La Jolla, US
- Lab. of Molecular Biology, Nencki Inst. of Experimental Biology, Warsaw, PL
- Leibniz Inst. for Age Research, Fritz Lipmann Inst. (FLI), Jena, DE
- Max Planck Inst. for Biochemistry, Martinsried, DE
- Max Planck Inst. for Immunobiology, Freiburg, DE
- Max Planck Inst. for Neurobiology, Martinsried, DE
- Max Planck International Research Network on Aging, Max Planck Inst. for Demographic Research, Rostock, DE
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- MRC Lab. for Molecular Cell Biology, University College London, GB
- Neurological Clinic, University of Tübingen, DE

- Neurologische Klinik, Technische Universität München, DE
- Neurosciences Group, Weatherall Inst. of Molecular Medicine, John Radcliffe Hospital, Oxford, GB
- Nucleus for Interdisciplinary Sound Studies, University of Campinas, BR
- Royal Victoria Hospital, McGill University, Montreal, CA
- RS Dow Neurobiology Laboratories, Legacy Research, Portland, US
- School of Biology, University of St Andrews, GB
- School of Biosciences, University of Birmingham, GB
- School of Medical Sciences, University of Aberdeen, GB
- Scottish Centre for Regenerative Medicine, University of Edinburgh, GB
- The Mind & Life Inst., Louisville, US
- Unité de Neurosciences Intégratives et Computationnelles (UNIC), UPR CNRS 2191, Gif-sur-Yvette, FR
- Vaccine and Gene Therapy Inst., Oregon Health and Science University, Beaverton, US
- Zentrum für Molekulare Neurobiologie, Universität Hamburg, DE

### Economy / Industry

- Agilent Technologies Inc., Santa Clara, US
- Alcon Laboratories Inc., Fort Worth, US
- Bruker Biospin AG, Fällanden, CH
- Compex Medical SA, Ecublens, CH
- ESBAtech AG, Zürich-Schlieren, CH
- Evotec Neurosciences AG, Hamburg, DE
- FBI Science GmbH, Technologiezentrum-Ruhr an der Ruhr-Universität, Bochum, DE
- GlaxoSmithKline AG, Verona, IT
- Hocoma AG, Volketswil, CH
- Invitrogen Dynal AS, Oslo, NO
- Merck Serono International S.A., Geneva, CH
- Miltenyi Biotec GmbH, Bergisch-Gladbach, DE
- MorphoSys AG, Martinsried/Planegg, DE
- Neurimmune Therapeutics AG, Zurich, CH
- NewBehavior AG, Zürich, CH
- Novartis Pharma Schweiz AG, Basel, CH
- Philips Medical Systems AG, Zurich, CH
- Sanofi-Aventis, Paris, FR
- Warren Pharmaceuticals Inc., Ossining, US
- Zühlke Engineering AG, Schlieren, CH

### Others

- Christopher Reeve Paralysis Foundation, Short Hills, US
- International Foundation of Research (IFP-Gesuch), Zurich, CH
- International Spinal Research Trust (ISRT), Surrey, GB

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	4 100 000	4 100 000	4 100 000	4 100 000	16 400 000	19
Self-funding from home institution <sup>1</sup>	1 500 000	1 500 000	2 200 000	2 200 000	7 400 000	8
Self-funding from ETH Zurich	1 500 000	1 500 000	1 500 000	1 500 000	6 000 000	7
Self-funding from project participants	12 276 006	13 604 557	12 059 836	15 828 456	53 768 855	61
Third-party funding <sup>2</sup>	999 384	1 089 819	1 319 241	1 083 334	4 491 778	5
<b>Total</b>	<b>20 375 390</b>	<b>21 794 376</b>	<b>21 179 077</b>	<b>24 711 790</b>	<b>88 060 633</b>	<b>100</b>

Personnel <sup>3</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	FR	IT	GB	AT	
Management	2.25	4	44	5	56	5	3	1	0	0	0	0
Master students	34	20	59	14	41	29	3	1	0	0	0	1
Doctoral students	157	63	40	94	60	56	49	6	10	2	2	35
Postdoctoral students	34	13	38	21	62	8	9	5	1	2	1	8
Research associates	19	11	58	8	42	11	3	0	2	0	0	4
Senior researchers <sup>4</sup>	129	35	27	94	73	46	39	10	3	2	2	29
Other staff	55	42	76	13	24	38	8	0	1	1	1	6
<b>Total</b>	<b>430.25</b>	<b>188</b>	<b>43</b>	<b>249</b>	<b>57</b>	<b>193</b>	<b>114</b>	<b>23</b>	<b>17</b>	<b>7</b>	<b>6</b>	<b>83</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 6 projects have been funded by CTI at a total amount of 12.2 million CHF.

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

### Members of the Review Panel

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 Bonhoeffer Tobias, Prof.  
 Clarke Hosek Stéphanie, Prof.  
 Compston Alastair, Prof.  
 Ghisalba Oreste, Prof.  
 Götz Magdalena, Prof.

Herrling Paul, Dr.  
 Lindvall Olle, Prof.  
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 Swiss National Science Foundation, Berne, CH  
 Institute of Stem Cell Research GSF, National Research Center for Environment and Health, Neuherberg, DE  
 Novartis Pharma AG, Basel, CH  
 Wallenberg Neuroscience Center, University Hospital of Lund, SE  
 Neurologische Universitätsklinik, Universität Tübingen, DE  
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# North-South: Research Partnerships for Mitigating Syndromes of Global Change

## NCCR North-South

### Home Institution

University of Bern

### Start of the NCCR

July 1, 2001

### NCCR Management

#### Directors

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#### Coordinator

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Deputy Coordinator  
Herweg Karl, Dr.

Management Assistant  
Vollenwyder Barbara, Ms.

Knowledge and  
Technology Transfer  
Michel Claudia, Dr.

Education and Training  
Herweg Karl, Dr.

Advancement of Women /  
Career Building  
Zimmermann Anne, Dr.

Partnership Actions  
Salmi Annika, lic. phil.

Communication  
Hirschbühl Tina, Ms.

Financial Management  
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#### Web Addresses

[www.north-south.unibe.ch](http://www.north-south.unibe.ch)  
[www.nccr-north-south.unibe.ch](http://www.nccr-north-south.unibe.ch)

#### Public Relations

- Research Partnerships for Global Change, Innovation and Sustainable Development, 2008 brochure
- Research Partnerships for Mitigating Syndromes of Global Change, 2007, flyer
- News on websites
- External Newsletter

### Research

#### Work Package “Governance and Conflict”

Head: Goetschel L.  
Deputy Head: Carton M.

- Negotiating Statehood
- Governance
- Conflict and Economy

#### Work Package “Livelihoods and Globalisation”

Head: Müller-Böker U.  
Deputy Head: Rabinovich A.

- Livelihoods, Concepts and Contexts
- Livelihood Strategies and Poverty
- Livelihoods and Territory

#### Work Package “Health and Environmental Sanitation”

Head: Tanner M.  
Deputy Heads: Schertenleib R.,  
Zinsstag J.

- Determinants of vulnerability and resilience
- Improved environmental sanitation
- Equity-effective interventions to alleviate poverty

#### Work Package “Natural Resources in Sustainable Development”

Head: Wiesmann U.  
Deputy Head: Hurni H.

- Environmental dynamics, natural resources and livelihoods
- Knowledge, values and power in natural resource management
- Development-environment nexus in trans-contextual settings

#### Transversal Package “Syndrome Mitigation and its Scientific Foundations”

Head: Hurni H.  
Coordinator: Rist S.

Extensive production systems in semi-arid regions – Options for sustainable future livelihoods

Leader: Bonfoh B.

The political economy of coffee: Global markets, local production and options for sustainable development

Leader: Ludi E.

The effect of development interventions disparities on the poverty - environment nexus: Negotiation and decision-making in trans-contextual settings

Leader: Messerli P.

From vulnerability to resilience: Assessing the potential and limitation of a new conceptual approach for pathways to sustainable development

Leader: Obrist B.

Innovations in decision-making processes for sustainable urban projects

Leader: Rabinovich A.

Operationalising human security for livelihood protection: Analysis, monitoring and mitigation of existential threats by and for local communities

Leader: Schnabel A.

Sustaining livelihoods in trans-local and trans-national settings

Leader: Thieme S.

Knowledge, power and politics: Evaluating institutional and social practices in sustainable development and syndrome mitigation research

Leader: Zingerli C.

#### Research in Joint Areas of Case Studies (JACS)

The NCCR North-South carries out integrated, context-specific, problem- and mitigation-oriented research in the following regions:

East Africa (EAF)

Coordinator: Kiteme B. (Kenya)

Horn of Africa (HOA)

Coordinator: Debele B.

(Ethiopia)

West Africa (WAF)

Coordinator: Cissé G.

(Ivory Coast)

South-East Asia (SEA)

Coordinator: Koottatep T.  
(Thailand)

South Asia (SAS)

Coordinator: Upreti B. (Nepal)

Central Asia (CAS)

Coordinator: Arynova M.

(Kyrgyzstan)

Central America and Caribbean (CCA)

Coordinator: Perez Gutierrez

M.A. (Costa Rica)

South America (SAM)

Coordinator: De la Fuente M.

(Bolivia)

Swiss Alps (ALP)

Coordinator: Wallner A.  
(Switzerland)

#### Partnership Actions for Mitigating Syndromes of Global Change (PAMS)

The NCCR North-South is implementing a series of pilot activities that apply research results in concrete development settings. These are proposed by partners and associated institutions through programme calls, selected by the Board, and executed in partnership with the WPs in JACS regions.

#### Platforms, Programmes etc.

Secretariat of the Swiss Commission for Research Partnerships with Developing Countries (KFPE)

Executive Secretary: Lys J.-A.

## North-South: Research Partnerships for Mitigating Syndromes of Global Change

### NCCR North-South

### Third Party Cooperation

(in progress)

#### Programmes

- IHDP

#### Research Institutions

- Abteilung Angewandte Linguistik (AAL), University of Bern, CH
- Centre for Molecular Microbiology and Infection, Imperial College, London, GB
- Centre Régional pour l'Eau Potable et L'Assainissement à faible coût (CREPA), Ouagadougou, BF
- Centro de Estudios Superiores de Mexico y Centroamerica, Univ. de Ciencias y Artes de Chiapas, San Cristóbal, MX
- Colegio de la Frontera Sur, Tapachula, MX
- Dept. of Anthropology, Kannur University (KU), Kerala, IN
- Dept. of Ecology and Natural Resources (IMECIBIO), University of Guadalajara, Autlán, MX
- Dept. of Plant Biology, Faculty of Science, University of Yaoundé, CM
- Dept. of Social & Environmental Medicine, Faculty of Tropical Medicine, Mahidol University, Bangkok, TH
- Dept. of Social Anthropology, University of Basel, CH
- Dept. of Systems Analysis, Integrated Assessment and Modelling (SIAM), Swiss Federal Inst. of Aquatic Science and Technology, Dübendorf, CH
- Ecole Supérieure d'Agronomie, Université de Lomé, TG
- Facultad de Ciencias Políticas y Sociales, Universidad Nacional Autónoma (UNAM), Mexico DF, MX
- Facultad Latinoamericana de Ciencias Sociales Programa Costa Rica, San José, CR
- Faculty of Environment and Resource Studies, Mahidol University, Nakhon Pathom, TH
- Fundación de la Universidad de Costa Rica para la Investigación (FUNDEVI), San José, CR
- Gestion, Université de Bamako, ML
- Hochschuldidaktik, Universität Bern, CH

### Heads of Individual Research Projects

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Goetschel Laurent, Prof.

Hurni Hans, Prof.

Ludi Eva, Dr.

Messerli Peter, Dr.

Müller-Böker Ulrike, Prof.

Obrist Brigit, Prof.

Rabinovich Adriana, Dr.

Schertenleib Roland, Dipl. Ing.

Schnabel Albrecht, Dr.

Tanner Marcel, Prof.

Thieme Susan, Dr.

Wiesmann Urs, Prof.

Zingerli Claudia, Dr.

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swisspeace, Bern, CH

Centre for Development and Environment, GIUB, University of Bern, CH

Overseas Development Institute ODI, London, GB

Centre for Development and Environment, Vientiane, LA

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Swiss Tropical Institute STI, University of Basel, CH

Laboratoire de Sociologie Urbaine LaSUR, INTER, EPF Lausanne, CH

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Centre for Development and Environment, GIUB, University of Bern, CH

Division of Human Geography, GIUZ, University of Zurich, CH

### Regional JACS Coordinators

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De la Fuente Manuel

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Regional Coordination Office Horn of Africa, Addis Abeba, ET

Regional Coordination Office South America, Cochabamba, BO

Centre for Training and Integrated Research in Arid and Semi-arid Lands Development CETRAD, Nanyuki, KE

Asian Institute of Technology (AIT), Pathumthani, TH

Facultad Latinoamericana en Ciencias Sociales FLACSO-CR

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### North-South Partnership Institutions

Agroecología Universidad Cochabamba AGRUCO, BO

Ayuda Obrera Suiza AOS, La Paz, BO

Central Department of Geography CDG, Tribhuvan University, Kathmandu, NP

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Centre de Technique de la Planification et d'Economie Appliquée CTPEA, Port-au-Prince, HT

Centre for Development Studies CDS, Kerala, IN

Centre for Security Studies FSK, Swiss Federal Institute of Technology, Zurich, CH

Centre for Training and Integrated Research in Arid and Semi-Arid Lands Development CETRAD,

Nanyuki, KE

Centre National d'Hygiène CNH, Nouakchott, MR

Centre Suisse de Recherches Scientifiques CSRS, Abidjan, CI

Centro Bartolomé de las Casas CBC, Centre for Andean Regional Studies, Colegio Andino, Cuzco, PE

Centro de Investigación para el Desarrollo CIDES, Universidad Mayor de San Andrés, La Paz, BO

City Government of Kunming, CN

Departamento de Organización del Espacio DOE, Universidad Centroamericana "José Simeón Cañas", San Salvador, SV

Département de Sociologie et Anthropologie, Université de Yaoundé DSA-UY, CM

Department of Geography, University Dar es Salaam, TZ

## Topics

The present-day world is threatened by increasing insecurity, which is caused by processes of global change, globalisation, and global disparities. There are regions where a number of core problems form clusters, which eventually lead to syndromes, the mitigation of which is a global challenge and a precondition for achieving sustainable development. The NCCR North-South will contribute, through high-quality, disciplinary, interdisciplinary and trans-disciplinary research, to an improved understanding of the status of different

syndromes of global change, the pressures these syndromes and their causes exert on different resources (human, natural, economic), and the responses of different social groups and society as a whole. By identifying the potentials of social systems for mitigating syndromes, by considering their dynamics, and by adhering to existing innovative solutions, the NCCR will also contribute to designing ways of mitigating syndromes. The NCCR North-South will enable Swiss research institutions to enhance partnerships

with institutions in developing and transition countries, thereby building competence and capacity in order to develop socially robust knowledge for mitigation action. Through its activities and partnerships, the NCCR North-South will contribute to developing the capabilities of partner institutions and societies at large in developing and transition countries, thereby eventually helping these institutions to find sustainable solutions with the means available in their own local contexts.

- Human and Natural Resource Studies Centre (HNRSC), Kathmandu University, NP
- Ifakara Health Research and Development Centre (IHRDC), Ifakara, TZ
- Inst. d'Ethno-Sociologie, Université de Cocody, Abidjan, CI
- Inst. National de Recherche en Santé Publique (INRSP), Nouakchott, MR
- Inst. Supérieur Inter-Etats de formation et de recherche dans les domaines de l'Eau, l'Energie, l'Environnement et les Infrastructures (EIER), Ouagadougou, BF
- Inst. for Human-Environment Systems (HES), Swiss Federal Inst. of Technology, Zurich, CH
- Inst. of Livestock, Veterinary Sciences and Pastures (ILVSP), Agrarian Academy, Bishkek, KG
- Inst. de Estudios Sociales (IESE), Universidad Mayor de San Simón, Cochabamba, BO
- Inst. del Conurbano (ICO), Universidad General Sarmiento (UNGS), Buenos Aires, AR
- Inst. Dr. José María Luis Mora, Mexico DF, MX
- Interdisziplinäres Zentrum für Frauen- und Geschlechterforschung (IZFG), Universität Bern, CH
- International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, NP
- Journalists for Democracy and Human Rights (JDHR), Islamabad, PK
- National Inst. of Hygiene and Epidemiology (NIHE), Hanoi, VN
- Postgraduate Program in Development Sciences, University Mayor de San Andrés (CIDES-UMSA), La Paz, BO
- Postgraduate Program in Social Work, Universidad Nacional Autónoma (PLATS-UNAH), Tegucigalpa, HN
- Research Inst. of Livestock, Veterinary and Pastures (RILVP), Bishkek, KG
- Sustainable Development Alternatives (SDA), Rawalpindi, PK
- Tata Inst. of Social Sciences (TISS), Mumbai, IN
- Unidad Azcapotzalco, Universidad Autónoma Metropolitana (UAM-A), Mexico DF, MX

Department of Natural Science, Kyrgyz-Russian Slavic University, Bishkek, KG

[Department of Urban Water Management UWM, EAWAG, Duebendorf, CH](#)

Directorship of the Sierra de Manantlán Biosphere Reserve DRBSM, Autlán, MX

[Ecole Inter-Etats d'Ingénieurs de l'Équipement Rural EIER, Ouagadougou, BF](#)

Ecole Supérieure des Sciences Agronomiques ESSA, University of Antananarivo, MG

[Ethiopian Amhara Region Agricultural Research Institute ARARI, Bahr Dar, ET](#)

Facultad de Agronomía, Agroecología, Universidad Cochabamba AGRUCO, BO

[Facultad Latinoamericana de Ciencias Sociales FLACSO, San José, CR](#)

Faculté des Sciences et Gestion de l'Environnement, Université d'Abobo-Adjamé -

UAA-FGS, Abidjan, CI

[Gujarat Institute for Development Research, Ahmedabad, IN](#)

INESA Société Inter-Entreprises, Port-au-Prince, HT

[Institute of Anthropology, University of Basel, CH](#)

Institute of Economic Growth, University Enclave, New Delhi, IN

[Institute of Social Anthropology ESUZ, University of Zurich, CH](#)

Institute of Urbanism, Faculty of Architecture and Urbanism, Central University of Venezuela,

Caracas, VE

[Instituto de Investigaciones Sociales IIS de la Universidad Nacional Autónoma de México UNAM,](#)

Mexico City, MX

Inter-Municipal Initiative IMI, Autlán, MX

[Kunming Institute of Environmental Science, CN](#)

Laboratoire de Recherches Vétérinaires et Zootechniques de Farcha LRVZ, N'Djaména, TD

[Laboratory of Hydrology and Land Improvement HYDRAM, ISTE, EPF Lausanne, CH](#)

Manantlán Institute of Ecology and Conservation of Biodiversity IMECBIO, University of Guadalajara,

Autlán, MX

[Mekong River Commission MRC, Vientiane, LA](#)

Nepal Institute of Development Studies NIDS, Kathmandu, NP

[Pollution Control Department PCD, Ministry of Natural Resources and Environment, Bangkok, TH](#)

Post-graduate Course on Developing Countries ETHZ-NADEL, Zurich, CH

[Potsdam Institute for Climate Impact Research PIK, Potsdam, DE](#)

## North-South: Research Partnerships for Mitigating Syndromes of Global Change

### NCCR North-South

#### Others

- Bread for All / Brot für Alle (BFA), Berne, CH
- Cooperation and Training Division, Urban Research Inst. (URI), Vientiane, LA
- Dept. of Health, Ministry of Public Health, Bangkok, TH
- Environment and Public Health Organisation (ENPHO), Kathmandu, NP
- Fundación Sodis, Cochabamba, BO
- Holistic Understanding for Justified Research and Action (HUJRA), Mingora, PK
- Inst. del Bien Común (IBC), Lima, PE
- Kyrgyz Sheep Breeding Association, Bishkek, KG
- Lao National Mekong Commission Secretariat (LNMCS), Vientiane, LA
- Maji na Ufanisi (Water & Development), Nairobi, KE
- OXFAM GB Bolivia, Fundación La Paz, Fundación para el Desarrollo Participativo Comunitario (FUNDEPCO), La Paz, BO
- Plan Maestro para la Revitalización Integral de la Habana Vieja, Havana, CU
- PROclim, Forum for Climate and Global Change, Swiss Academy of Sciences, Berne, CH
- Republican Center of Veterinary Diagnostics (RCVD), Bishkek, KG
- Research Inst. of Livestock, Veterinary and Pastures, Lebedinovka Village, KG
- Rural Advisory Services "Chui", Bishkek, KG

#### Achievements

Four Work Packages (WP) and one Transversal Package (TP) form the scientific core of the NCCR North-South. Each of these brings together at least two Institutional Partners (IPs), representing specific fields of scientific competence that contribute to syndrome mitigation research. The four Work Packages focus on (1) governance and conflict transformation, (2) livelihoods and globalisation, (3) health and environmental sanitation, and (4) natural resources in sustainable development. Activities are carried out in nine partnership regions worldwide (JACS) on four continents. These regions form the focal point and platform of partnership-based disciplinary, inter- and transdisciplinary research projects on global change and sustainable development.

#### Scientific Output

Activities in the first seven years led to 848 publications (of which over 297 were refereed), 500 reports and more than 1500 presentations, all of which resulted directly from the research carried out in the programme. A total of 150 PhD studies have been launched so far, of which 65 are now completed. In the past year, almost 20 new PhD students were selected.

#### Integration and Synthesis

The most important means of integration is the Transversal Package (TP). The TP focuses on "Syndrome mitigation and its scientific foundations", and works with eight TP projects at the interface between at least two Work Package themes and in different partnership regions to allow comparison of patterns of global change. These TP projects have been entrusted to research teams under the leadership of promising post-doctoral researchers from the North and the South who aspire to academic careers. After three years of activity, the TP projects have already produced a multitude of scientific outputs, proving their effectiveness in integrating research across disciplinary boundaries.

After six years of programme activity, the NCCR North-South has also started a mid-term synthesis of the programme's research results. The core output of this synthesis project will be two publications of about 400 pages each, with contributions by researchers from all programme entities. Different contributions to this publication were discussed at an International Conference, held from 2 to 4 July 2008 in Switzerland.

#### Institutionalisation

On 1 October 2008 the NCCR North-South started an inter-university 'Doctoral Programme on Global Change, Innovation and Sustainable Development'. The idea behind this cooperative project is to build on the experience of the NCCR North-South by creating a permanent structure for sustainability research that focuses on the needs of developing and transition countries. By incorporating the experience of the NCCR North-South, the doctoral programme will be a unique addition to the landscape of higher education in Switzerland, guaranteeing training at doctoral, post-doctoral and possibly also master's levels in the long term. Participating institutions so far are the Universities of Bern, Zurich, and Basel, including the Swiss Tropical Institute and Swisspeace. The existing partnerships with research institutions in developing countries will continue to be an integral component of the programme.

Further information see [www.north-south.unibe.ch](http://www.north-south.unibe.ch)

School of Environment, Resources and Development SERD, Asian Institute of Technology AIT, Bangkok, TH

[Sustainable Development Policy Institute SDPI, Islamabad, PK](#)

Swiss Agency for Development and Cooperation SDC, Regional Cooperation Office, Bishkek, KG  
[Tajik Academy of Sciences, Dushanbe, TJ](#)

UNESCO World Natural Heritage Site, Jungfrau-Aletsch-Bietschhorn JAB, Naters, CH

[Universidad Mayor de San Simon UMSS, Cochabamba, BO](#)

University of Cocody, Abidjan, CI

[Uzbek Academy of Sciences, Tashkent, UZ](#)

Yunnan Academy of Social Science, Kunming, CN

- Science et Cité, Berne, CH
- Science, Technology and Environment Organization (STENO), Vientiane, LA
- Southeast Asian Ministers of Education Organization, Regional Centre for Archeology and Fine Arts (SEAMEO-SPAFA), Bangkok, TH
- State Secretariat for Economic Affairs (SECO), Bern, CH
- Sustainable Development Alternatives (SDA), Islamabad, PK
- Swiss Association of Research Managers and Administrators (SARMA), Università della Svizzera Italiana, Lugano, CH
- Swiss Information and Data Archive for the Social Sciences (SIDOS), Neuchâtel, CH
- Swiss Red Cross, Bishkek, KG
- Urban-Rural Solutions (URS), Hanoi, VN
- Velux Foundation, Zurich, CH
- Water for Asian Cities Programme (WAC), UN-Habitat, Kathmandu, NP
- Water Supply and Sanitation Collaborative Council (WSSCC), Geneva, CH

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	3 500 000	3 500 000	3 500 000	3 500 000	14 000 000	39
Self-funding from home institution <sup>1</sup>	490 714	499 800	562 470	785 180	2 338 164	6
Self-funding from project participants	1 396 046	1 394 679	1 188 039	1 241 163	5 219 927	14
Third-party funding from SDC	2 879 258	3 202 190	4 074 528	4 589 926	14 745 902	41
<b>Total</b>	<b>8 266 018</b>	<b>8 596 669</b>	<b>9 325 037</b>	<b>10 116 269</b>	<b>36 303 993</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							NP	KG	AR	KE	DE	
Management	6.70	8	40	12	60	17	0	0	0	0	2	5
Master students	69	35	51	34	49	25	19	0	0	2	0	19
Doctoral students	80	30	38	50	63	20	5	4	1	0	4	45
Postdoctoral students	4	2	50	2	50	1	0	0	0	0	0	3
Research associates	79	40	51	39	49	20	1	9	14	5	2	28
Senior researchers <sup>4</sup>	122	34	28	88	72	34	6	4	5	5	11	67
Other staff	75	46	61	29	39	29	4	8	4	9	1	22
<b>Total</b>	<b>435.70</b>	<b>195</b>	<b>43</b>	<b>254</b>	<b>57</b>	<b>146</b>	<b>35</b>	<b>25</b>	<b>24</b>	<b>21</b>	<b>20</b>	<b>189</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>3</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>4</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

### Members of the Review Panel

Butera Fabrizio, Prof. (Chair)  
Bradley David, Prof.

Swiss National Science Foundation, Berne, CH  
Department of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, GB

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Swiss National Science Foundation, Berne, CH

Jeffery Roger, Prof.  
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Department of Economics, University of Hyderabad, Hyderabad, IN

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Shisana Olive, Dr.  
Stocking Michael, Prof.

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Human Sciences Research Council, Cape Town, ZA  
School of Development Studies, University of East Anglia, Norwich, GB

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# Plant Survival in Natural and Agricultural Ecosystems

## NCCR Plant Survival

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### Web Address

www.unine.ch/plantsurvival

### Public Relations

- Plant Survival News (trilingual English, French and German)
- Press releases
- Website

### Research

#### Module "Natural and Agro-Ecosystems"

##### Multitrophic interactions

Head: Turlings T.  
Bacher S., Benrey B., Bshary R., Farmer T., Kuhlemeier C., Rahier M.

##### Genetic introgression and ecological consequences

H: Bigler F.  
Bernasconi G., Felber F., Nentwig W., Romeis J.

##### Evolution and spread of potentially invasive plants

H: Guisan A.  
Buttler A., Gillet F., Müller-Schärer H., Schaffner U., Steinger T.

#### Module "Disease Resistance and Pest Control"

##### Grapevine diseases and resistance mechanisms

H: Neuhaus J.-M.  
Métraux J.-P., Gindro K., Mauch-Mani B., Tamm L., Viret O.

### Heads of Individual Research Projects and Subprojects

Bacher Sven, Prof.  
Benrey Betty, Dr.  
Bernasconi Giorgia, Prof.  
Bersier Louis-Félix, Dr.  
Bigler Franz, Dr.  
Bshary Redouan, Prof.  
Buttler Alexandre, Prof.

Davison Anthony C., Prof.  
Fankhauser Christian, Prof.  
Farmer Edward E., Prof.

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Gillet François, Dr.  
Gindro Katia, Dr.  
Gobat Jean-Michel, Prof.  
Goldstein Darlene, Dr.  
Guerin Patrick, Dr.

Development of novel control methods for grape moths based on their sex pheromones and host plant attractants

H: Guerin P.

#### Module "Energy-Resources"

##### Plastid function and plant survival

H: Kessler F.  
Hörtensteiner S., Fankhauser C., Rentsch D., Rochaix D., Zeeman S.

##### Mycorrhiza development and functioning, and its effect on soil structure

H: Martinoia E.  
Gobat J.-M., Reinhardt D., Paszkowski U.

#### Module "Modelling and Statistics"

##### Statistical and dynamical modelling

H: Davison A.  
Gillet F., Goldstein D., Bersier L.-F.

### Technological Platforms, Programmes etc.

#### Sequencing and microarrays

H: Neuhaus J.-M.

#### Chemical analysis

H: Vallat A.

#### ICP-MS analysis

H: Föllmi K.

#### Greenhouse facilities

H: Felber F.

#### Data analysis

H: Davison A.

#### Doctoral Programme

H: Turlings T.

#### GIS facilities (ECOSPAT lab)

H: Guisan A.

## Topics

The survival and performance of plants is of fundamental importance to both the preservation of biodiversity and sustainable agriculture. We explore interactions between plants, insects and pathogens, and also among plants, from the molecule to the ecosystem and landscape level. Research on plant fitness and abiotic interactions focuses on chloroplast metabolism under changing light conditions and nutrient

acquisition, the latter being improved by symbioses with arbuscular mycorrhizal fungi. The field of plant insect interactions deals with chemical defence compounds produced by the plant that attract natural enemies of its pests at the leaf-air and root-soil interfaces. Identifying the genes that play a role in pollinator selection is another aspect of this topic. Studies on the spread and

impact of invasive plants consist in refining and extending the investigations on the causes of invasiveness. The aim is also to understand why, in contrast to invasive alien species, many native species are declining in the landscape. To support these research efforts, novel statistics and modelling methods are being developed, thereby providing an impetus for such interdisciplinary collaborations in Switzerland.

## Third Party Cooperation

(in progress)

### Programme

- ALARM
- COST 858
- DAISIE
- IGGP
- PRATIQUE
- SiTraMaisBT

### Research Institutions

- Academia Sinica, Taipei, TW
- Botanical Inst., University of Cologne, Köln, DE
- Carnegie Inst. of Washington, Stanford, US
- Center for Environmental Science, Appalachian Laboratory, Frostburg, US
- Center for Integrative Genomics, University of Lausanne, CH
- Centre de coopération internationale en recherche agronomique pour le développement (CIRAD), Montpellier, FR
- Centre for Organic Agriculture, University of Newcastle, GB
- Centre for Sustainable Agriculture, Lancaster University, GB
- Commonwealth Scientific and Industrial Research Organisation (CSIRO), Canberra, AU
- Dépt. de biologie moléculaire végétale, Université de Lausanne, CH
- Dépt. d'écologie et d'évolution, Université de Lausanne, CH
- Dept. of Agricultural and Environmental Sciences, University of Newcastle, GB
- Dept. of Biology, University of Technology of Darmstadt, DE
- Dept. of Ecology and Evolution, State University of New York, US
- Dept. of Horticulture and Landscape Architecture, University of Colorado, Fort Collins, US
- Dept. of Life Science, University Pohang, Postech, KR
- Dept. of organic farming and cropping, University of Kassel, DE
- Dept. of Plant Physiology, Umea University, SE
- Division of Molecular And Cellular Biology, Nagoya University, JP
- Ecole d'ingénieurs de Changins, CH
- Ecological Sediment and Soil Assessment (ECOSSA), München, DE
- Facultad de Agronomía, Universidad Mayor de San Andrés, La Paz, BO
- Fisiología vegetal, Universitat Jaume, Castillon, ES
- Genetics Research Unit, United States Dept. of Agriculture, Geneva, US
- Horticulture Dept., Purdue University, US
- Inst. de Biologie Physicochimique, Centre National de la Recherche Scientifique (CNRS), Paris, FR
- Inst. de chimie moléculaire, Université de Bourgogne, Dijon, FR
- Inst. de recherche pour l'ingénierie de l'agriculture et de l'environnement (Cemagref), Grenoble, FR

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- Unité Mixte de Recherche INRA/CNRS, Plante-Microbe-Environnement (PME), Dijon, FR

## Achievements

### Interdisciplinary research

The NCCR Plant Survival is interested in the interactions between plants and their environment. We were able to show that induced maize volatiles not only attract natural enemies of herbivores, but can also cause resistance to pathogens and prime defences in neighbouring plants. Key petunia flower colour and odour genes involved in pollinator attraction have been discovered. Research on insecticidal toxins from transgenic plants did not show any negative effect on non-target invertebrates studied so far. While investigating the causes of invasiveness in plants, a climatic niche shift was identified for the first time in the new range, together with a genetic change.

Regarding grapevine resistance to pathogens, the possible role of soil and soil management was thoroughly assessed. The control of grapevine pests by using sex pheromones for the grape berry and codling moths can be increased by admixture of plant volatiles. Finally, research on energy and resources included the study of metabolic processes in the chloroplast and of arbuscular mycorrhizal colonization. All these investigations have been completed by statistical and modelling approaches: for instance, stochastic modelling of insect behaviour or

new tools to target good candidate genes in high dimensional datasets.

### Technology transfer

Our partner institutions are oriented towards applied research and closely involved in our NCCR: Agroscope ACW Changins-Wädenswil, ART Reckenholz, HSW Wädenswil, HES Changins, HEV Sion, SHL Zollikofen, FiBL, CABL. Twenty-seven applied projects are currently ongoing: five European Projects (1 FP6, 4 COST), two CTI/KTI, eight NFP, seven projects are directly supported by industries, two projects are subsidised by foundations and three are financed by Swiss Agencies.

### Public relations

The newsletter Plant Survival News appears twice a year in a trilingual issue (English, French and German). Additionally, a small brochure presenting the Third Phase research themes will be available in Spring 2009, together with the presentation of the NCCR's Work Packages on the website. Up to 10 press releases per year are sent to the Swiss media to inform the public about the broad spectrum of our research network. Additionally, meetings with local journalists have been organised in order to show the daily work of NCCR Plant Survival scientists.

### Doctoral programme

During the academic year 2007-2008, the 71 Ph.D. students enrolled in the Doctoral programme "Plants and their Environment" were offered a choice between 8 courses in communication, tools for research, and scientific topics. The Doctoral programme is part of the regular offer of the CUSO and as such also organized several courses in collaboration with the 3ème cycle romand en sciences biologiques. Mobility grants were awarded to allow Ph.D. students to visit and work in other laboratories and to present their research at international congresses. As of April 2009, the financing and management of the doctoral programme will be taken over by the University of Neuchâtel and will become one of the regular inter-university programmes within the CUSO.

### Equal opportunities

This year, all projects were jointly organised with the equal opportunities (EO) office of the University of Neuchâtel. Measures continue to be taken allowing young parents and highly qualified women to deal with the challenges of contemporary academic and administrative environments. Animations, experiments and exhibitions were proposed for children to awake their interest for a scientific career.

Further information see [www.unine.ch/nccr/](http://www.unine.ch/nccr/)

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	3 250 000	3 250 000	3 250 000	3 250 000	13 000 000	39
Self-funding from home institution <sup>1</sup>	1 240 025	1 379 964	1 404 183	600 000	4 624 172	14
Self-funding from project participants	3 125 324	4 145 506	3 932 096	3 507 582	14 710 508	44
Third-party funding <sup>2</sup>	270 162	492 088	604 729	0	1 366 979	4
<b>Total</b>	<b>7 885 511</b>	<b>9 267 558</b>	<b>9 191 008</b>	<b>7 357 582</b>	<b>33 701 659</b>	<b>100</b>

Personnel <sup>3</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							FR	DE	GB	NL	US	
Management	5.53	9	64	5	36	9	0	0	1	1	1	2
Master students	4	2	50	2	50	3	0	1	0	0	0	0
Doctoral students	62	28	45	34	55	33	13	9	0	1	2	8
Postdoctoral students	22	12	55	10	45	5	7	2	0	1	0	7
Research associates	5	3	60	2	40	3	0	1	0	0	0	1
Senior researchers <sup>5</sup>	62	16	26	46	74	32	7	9	4	3	1	7
Other staff	21	15	71	6	29	20	0	0	1	0	0	0
<b>Total</b>	<b>181.53</b>	<b>85</b>	<b>45</b>	<b>105</b>	<b>55</b>	<b>105</b>	<b>27</b>	<b>22</b>	<b>6</b>	<b>6</b>	<b>4</b>	<b>25</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 2 projects have been funded by CTI at a total amount of 2.7 million CHF.

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Economy / Industry

- Affymetrix, Inc., Santa Clara, US
- AgriSense-BCS Limited, Pontypridd, GB
- BASF Chemical Company, Ludwigshafen, DE
- Bio-Protection & Development on Vineyards (BioProDev), Bettembourg, LU
- Burri Agricide, Ligerz, CH
- Cosmotec SA, Collombey-Le-Grand, CH
- Isagro S.p.A., Milano, IT
- Kael Cosmetic SA, San Francisco, US
- MONSANTO Company, Ecological Technology Center, St-Louis, US
- NimbleGen Systems Inc., Madison, US
- Omya AG Agro, Oftringen, CH
- Suterra LLC, Bend, US
- Syngenta Crop Protection, Research Biology, Stein, CH

## Others

- Alliance, EPFL, Lausanne, CH
- CimArk SA, Sion, CH
- DLR-Rheinpfalz Phytomedizin / Biotechnologischer Pflanzenschutz, Neustadt, DE
- El Ceibo - Piaf, Sapecho, BO
- El Paraiso, Sapecho, BO
- Euresearch, Berne, CH
- Office cantonal d'agroécologie, Service de l'Agriculture, Châteauneuf, CH
- RACINES, Geneva, CH

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# Climate Variability, Predictability and Climate Risks

## NCCR Climate

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### Start of the NCCR

April 1, 2001

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### Research

#### Work Package 'Past Climate Variability'

Leader: Luterbacher J.

#### MONALISA Modelling and reconstruction of North Atlantic atmosphere-ocean variability (P 1.1)

Head: Stocker T.  
Raible C.

#### PALVAREX Paleoclimate variability and extreme events

H: Wanner H.  
Luterbacher J.

#### VIVALDI Variability in Ice, Vegetation and Lake Deposits- Integrated

H: Schwikowski M.  
Gäggeler H., Beer J.,  
Grosjean M., Leuenberger M.

#### EXTRACT Extended Thousand-year Reconstruction of Alpine Climate from Tree-rings

H: Esper J.  
Frank D.

#### Work Package 'Climate Dynamics and the Future'

Leader: Davies H.

#### GLOBCLIM Global Climate Processes and Scenarios

H: Wild M.  
Lohmann U.

#### REGCLIM Regional Climate Processes and Scenarios

H: Schär C.

#### VARCLIM Intra-seasonal and Inter-annual Climate Variability

H: Davies H.C.  
Martius O.

#### STARTWAVE Acquisition and Analysis of Critical Observations

H: Mätzler C.  
Philipona R., Kämpfer N.,  
Morland J., Schmutz W.,  
Vuilleumier L.

#### PRECLIM Operational Climate Prediction and Risk Analysis

H: Appenzeller C.  
Liniger M.

#### Work Package 'Ecosystems impacts and management'

Leader: Fuhrer J.

#### PLANT/SOIL How Do Extreme Climate Events Affect Plant/Soil Interactions in Agroecosystems?

H: Feller U.  
Buchmann N., Schmidt M.

#### GRASS Climate Change and Food Production

H: Fuhrer J.  
Calanca P L., Lehmann B.

#### CANOPY Hydrological Implications of Atmospheric CO<sub>2</sub> Enrichment in Forests

H: Körner C.  
Leuzinger S.

#### ECOHYDRO Projecting the Impacts of Changes in Climate and Land Use on the Ecology and Hydrology of Mountain Catchments

H: Bugmann H.  
Fahse L., Wolf A.

#### Work Package 'Climate Risks'

Leader: Stephan G.

#### ETS Assessment of Energy Technology Strategies

H: Wokaun A.  
Turton H.

#### CVR Climate Vulnerability and Risk in a Post-Kyoto World

H: Stephan G.  
Buob S.

#### MIADAC Modelling Sectoral Climate Change Policies: Mitigation, Adaptation, and Acceptability

H: Thalmann P.  
Altamirano J.-C.

#### CAPRICORN Climate Anom- alies and Coping Strategies of Societies in Central Europe: the Historical Dimension

H: Pfister Ch.

#### Integrated Projects and Fast Track Studies

#### SECOND CHANCE Socio- economic Consequences Due to Changing Climate and Extreme Events

H: Beniston M.

### Programmes

#### Yearly Summer School

H: Grosjean M.

#### PhD student meetings

H: Xoplaki E.

#### Workshops co-organized with ProClim

H: Grosjean M.  
Xoplaki E.

## Topics

Comprehensive insight and sound understanding of 1) natural climate variability, modelling and high-resolution climate reconstruction over the last 1000 years, 2) global and regional climate processes, seasonal and inter-annual climate variability and more accurate predictions, including extreme events, 3) assess implications of climate variability and change for ecosystems and to evaluate possible adaptive strategies

for the management of forests and agriculture and, 4) potential perspectives for regional and global post-Kyoto climate policies, vulnerability of regional and global economies to the adaptation to global climate change. The NCCR Climate links four work-packages: "Past Climate Variability", "Climate Predictability, Processes, and Projections", "Ecosystem Impacts and Adaptation", and "Climate Risks". The NCCR

Climate is a research network of institutions within Switzerland with ONE common scientific vision and collaborates with national and international programmes (ProClim, WCRP-CLIVAR, IGBP, UNFCCC, IPCC, ERA). The NCCR Climate commits itself to a firm effort in education, to knowledge transfer and interaction with key-persons in administration, politics, the private sector and the public.

## Third Party Cooperation

### Programmes

- ADAM (FP6)
- ALARM (FP6)
- AMIP II
- AustroClim
- CarboEurope-IP (FP6)
- CARBOOCEAN IP (FP6)
- CECILIA (FP6)
- CIRCE (FP6)
- COSMO-LEPS
- COST 725
- COST 733
- COST 734
- DILPA
- ECOCHANGE (FP6)
- ECSN
- ENSEMBLES (FP6)
- ENSEMBLES (FP6)
- EUROCEANS (FP6)
- GEOMON (FP6)
- GrassGas
- IGBP - PAGES
- Lignin Turnover
- MedCLIVAR
- MILLENNIUM (FP6)
- NDACC
- NEEDS (FP6)
- NICOLA
- SoilGas
- TOCSIN (FP6)
- WCRP-BSRN
- WCRP-CLIVAR
- WMO-LRF
- WWRP-MAP

### Research Institutions

- Agenzia Regionale Prevenzione e Ambiente dell'Emilia Romagna (ARPA), Bologna, IT
- Alfred Wegener Institut, Bremerhaven, DE
- British Antarctic Survey, Cambridge, GB
- Canadian Institute for Climate Sciences, University of Quebec, Montreal, CA
- Center for Environmental Prediction, Rutgers University, New Brunswick, US
- Centre for Energy Policy and Economics, ETHZ, Zürich, CH
- Centre for Marine and Climate Research, University of Hamburg, DE
- Climate and Global Dynamics Division, National Center for Atmospheric Research, Boulder, US
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- Department of Physics, University of Oxford, GB
- Department of Plant Biology, University of Illinois, Urbana, US
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- Groupe d'Etudes et de Recherche en Analyse des Décisions (GERARD), Mc Gill University, Montréal, CA
- Hadley Centre for Climate Prediction and Research, Exeter, GB
- Institut d'Economie et de Politique de l'Energie (IEPE-CNRS), Grenoble, FR
- Institut für Energiewirtschaft und Rationelle Energieanwendung (IER), Universität Stuttgart, DE
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- Institute of Soil Science, TU Berlin, DE
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- International Pacific Research Center, University of Honolulu, US
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## Climate Variability, Predictability and Climate Risks NCCR Climate

### Achievements

The SNSF Review Panel stated in the Assessment Report 2004: "The NCCR Climate is unique in its interdisciplinary focus, not just for Switzerland or Europe, but globally". Building on firm structural and institutional foundations, the NCCR Climate network led to significant achievements in four areas: distinct scientific impact, international leadership through networks, sustained education at postgraduate level, and extended public relations. The Graduate School "Climate Sciences" (M.Sc. and Ph.D. University of Bern) concerted with the M.Sc. "Atmospheric and Climate Science" (S-EN ETH) opened in 2006/2007.

### Science

The NCCR Climate shaped the profile of Swiss climate research through collaborative novel and timely scientific contributions with a high impact. Examples are the reconstruction of temporally highly-resolved European temperature and precipitation

fields back to 1000 or the assessment of extreme climate such as the European summer 2003 being the hottest of the last 500 years. Simulations with different climate models show that about every second summer can be as warm or warmer in 2070 - 2100 than the summer 2003. With a focus on Switzerland, a set of scenarios for severe climate events (heat-waves, wind, drought, heavy precipitation, flood) has been produced, and the impact on society, agriculture and forests has been assessed. Information about extreme events in a changing climate is vital for risk assessment in financial business (e.g., investment and insurance). Operational tools for the climate forecast of up to six months were developed, novel ways of coupling climate and economic models were explored, and future ways of the Kyoto process were studied. Evidently, a hierarchy of state-of-the-art models (global and regional climate models, regional

and local impact models) and large observational datasets are a prerequisite to address such targets.

### Other Aspects

NCCR Climate researchers take leadership in the UNFCCC, IPCC process and in international programmes (IGBP, WCRP, WMO, ERA). The NCCR Climate Summer School is a highly competitive internationally recognised platform for young scientists and attracts distinguished teachers. The NCCR Climate works closely with stakeholders, governmental agencies and the private sector. Public interest in NCCR Climate research is unprecedented. In 2007 the NCCR Climate had its first major structural impact: the University of Berne inaugurated the Oeschger Center for Climate Change Research! In 2008 the Centre for Climate System Modelling C2SM was inaugurated at ETH Zurich.

Further information see [www.nccr-climate.unibe.ch](http://www.nccr-climate.unibe.ch)

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- Past Global Changes of IGBP (PAGES), Bern, CH
- ProClim Forum for Climate, Bern, CH
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## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	2 900 000	2 612 000	2 466 000	2 022 000	10 000 000	21
Self-funding from home institution <sup>1</sup>	910 638	450 194	637 141	759 280	2 757 253	6
Self-funding from project participants	5 732 839	4 925 175	4 671 161	4 515 548	19 844 723	42
Third-party funding	12 893 713	563 911	419 141	458 000	14 334 765	31
<b>Total</b>	<b>22 437 190</b>	<b>8 551 280</b>	<b>8 193 443</b>	<b>7 754 828</b>	<b>46 936 741</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							CH	FR	AT	IT	GB	
Management	4.55	3	27	8	73	8	1	0	0	1	0	1
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	54	14	26	40	74	35	13	2	0	4	0	3
Postdoctoral students	36	7	19	29	81	13	10	3	2	0	2	6
Research associates	12	9	75	3	25	3	4	2	1	0	0	2
Senior researchers <sup>4</sup>	53	5	9	48	91	30	14	3	2	0	2	5
Other staff	26	12	46	14	54	23	2	0	0	0	0	0
<b>Total</b>	<b>185.55</b>	<b>50</b>	<b>26</b>	<b>142</b>	<b>74</b>	<b>112</b>	<b>44</b>	<b>10</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>17</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>3</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>4</sup> Including leaders of the individual projects and other organisational units of the NCCR

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# Materials with Novel Electronic Properties – Basic Science and Applications

## NCCR MaNEP

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### Start of the NCCR

July 1, 2001

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### Research

#### Strongly interacting electrons, low-dimensional and quantum fluctuation dominated systems

Head: Sigrist M.

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Mesot J., Mila F., Ott H.R.,  
Renner C., Schlapbach L.,  
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Van der Marel D.

#### Superconductivity, unconventional mechanisms and novel materials

H: Van der Marel D.  
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Ott Hans-Rudolf, Prof.  
Paruch Patrycja, Prof.

#### Crystal growth

H: Forró L.

Participating members:  
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Mesot J., Schlapbach L.,  
van der Marel D.

#### Novel materials

H: Hulliger J.  
Participating members:  
Forró L., Hulliger J., Karpinski J.,  
Nesper R., Schilling A.,  
Schlapbach L.

#### Thin films, artificial materials and novel devices

H: Triscone J.-M.  
Participating members: Aebi P.,  
Fischer Ø., Morpurgo A., Paruch  
P., Schilling A., Triscone J.-M.,  
van der Marel D.

#### Industrial applications and pre-application development

H: Fischer Ø.

Participating members:  
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Flükiger R., Forró L., Hasler M.,  
Mesot J., Nesper R., Sommer P.,  
Triscone J.-M., Yvon K.

#### Platforms, Programmes etc.

##### Industry Network

Swiss Workshop MaNEP  
«Les Diablerets»

Winter School MaNEP  
«Saas-Fee»

MaNEP Mobile  
Post-Doc Program

Advancement of Women  
MaNEP Summer Internships.  
MaNEP Doctoral School

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## Topics

In the last twenty years, numerous new electronic materials have been discovered with interesting and often complex crystalline structures and outstanding new electronic properties. These new striking properties are found in some magnetic, ferroelectric and superconducting compounds. All these compounds have a large potential for applications and we believe that they will play a key role in advanced future

electronic devices. Among the materials displaying these unexpected exceptional properties, many share in common a low dimensionality and a low carrier density. Most of them are complex oxide systems and, in many of these materials, electronic interactions play an important role making these systems very difficult to treat theoretically. Another characteristic of these systems is that they often have competing

ground states, for instance magnetic and superconducting, which makes them very sensitive to many external parameters, leading to interesting functionalities. In MaNEP, the main goals of our NCCR are to develop a basic understanding of these new materials, to prepare for their applications, and to train young scientists in this important field for future electronic applications.

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## Communication

In 2007 and 2008:

- The SupraFête: a big event to celebrate 20 years of high-temperature superconductors
- Contribution to the PSI open days
- The PhysiScope: official inauguration on 3 October 2008
- New movie (3-language DVD): "Superconductivity: a short story of an enduring enigma"
- Exhibition and brochure illustrated by Swiss cartoonist "Mix&Remix": "La Guerre du Froid: la superconductivité (re)vue par Mix&Remix"
- Partnerships with CERN: Open Doors, special exhibition and conference
- Participation in UniGE's Science Cafés for high-school students
- New MaNEP brochures: general presentation & KTT
- Electronic Newsletter (4-6 per year)
- Website: regular updates and improvements

## Third Party Cooperation

(in progress)

### Programme

- CMA (FP6-NMP)
- ECOM
- FUNCARS (FP5)
- INTAS (FP6-NIS)
- NES
- Pishift (ESF)
- PNANO-ANR
- SCOPES (SNSF)
- SINPHONIA (FP 6)
- THIOX (ESF)

### Research Institutions

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## Materials with Novel Electronic Properties – Basic Science and Applications NCCR MaNEP

### Achievements

#### Science

In MaNEP phase II, the scientific activities are organized around six projects. The main idea which led to this structure was to center our efforts on the key questions in the area of MaNEP. In the following we give examples of some of the highlights: In Project I, “Strongly interacting electrons, low-dimensional and quantum fluctuation dominated systems”, a collaboration of several groups (PSI, ETHZ, EPFL, UNIGE) has investigated the properties of quantum spin systems whose connectivity involves spin multimer units. In particular Bose Einstein condensation was demonstrated in spin dimer systems. In Project II, “Superconductivity, unconventional mechanisms and novel materials”, a collaboration (UNIGE, PSI, EPFL) has been established to investigate the mechanism behind high temperature superconductivity by spectroscopic methods. One important result is the quantitative interpretation of tunnelling spectra involving a coupling of electrons to a bosonic mode. Another collaboration (PSI, UNIGE, UNIZH) demonstrated the presence of an anomalous proximity effect in artificial oxide multilayers. With the establishment of Project III, “Crystal growth”, we have achieved to reinforce crystal growth activities in Switzerland and to establish a close collaboration between four crystal growth groups (UNIGE, EPFL, ETHZ, PSI). A large selection of crystals is presently available for the members of MaNEP. Project IV, “Novel Materials”, is a focused effort introducing novel chemical approaches to search for new electronic materials. In project V, “Thin Films, Artificial Materials, and

Novel Devices”, thin films, heterostructures, and superlattices of correlated oxides have been realized and studied. A MaNEP collaboration (UNIGE, UNINE) has demonstrated that ferroelectricity can exist in layers as thin as one unit cell and discovered superconductivity at the interface between two insulating oxides. Finally, Project VI, “Industrial applications and pre-application development”, has three main themes: Applied Superconductivity, Sensors and Thin Film Development and Applications. Each of these themes is composed of several applied projects involving a total of 5 industrial companies, one start-up, the technical university HES-Genève and four member institutions of MaNEP.

#### Know-how and technology transfer

MaNEP has established several collaborations with industry and the HES-Geneva in different domains where MaNEP skills and materials knowledge is needed. These collaborations are carried out within project VI described above. A first spin-off company “PHASIS” is active in the field of thin film fabrication and build on know how developed in MaNEP.

#### Education and advancement of women

After having co-organised a summer school with PSI in 2002 in Zuoz, MaNEP organized two successful summer schools at Saas-Fee (2004, 2006). About 70 students followed lectures given by international experts. A large part of the students were MaNEP doctoral students, but the school also admitted students from other countries. The next event in this series is a winter school in January 2009 in Saas-Fee. The MaNEP doctoral pro-

gram has been launched at the University of Geneva and the first courses started in autumn 2008.

MaNEP organises since 2004 summer internships for female students, giving the latter a chance to integrate research groups at the different universities and federal institutes in MaNEP. These internships are very appreciated by the participants. A young associate professor, Dr. Patrycja Paruch was appointed at the University of Geneva in 2007.

#### Communication and outreach

MaNEP has carried out ambitious communication/outreach projects, especially in the last 2 years. In June 2007, a special three-day event called the SupraFête gathered over 1500 people who came to discover superconductivity. This provided the opportunity to create new PR tools: a new 10-minute movie was thus produced, as well as a humorous exhibition - and brochure - illustrated by Swiss cartoonist Mix&Remix. In October 2008, MaNEP celebrated the official launch of the PhysiScope, a public demolab for high-school students to promote today's physics in a fun, stimulating and hands-on way. The project was initiated, implemented and publicised by a MaNEP team, in collaboration with staff from the Physics Section at UniGE. An estimated 5000 visitors are expected to visit the PhysiScope in the coming year. 2008 was also marked by fruitful PR collaborations with CERN, with MaNEP participating in the LHC's Open Doors in April, and in a 3-month exhibition from November 2008 to January 2009.

Further information see [www.manep.ch](http://www.manep.ch)

- Inst. of the Low Temperature Physics, Polish Academy of Sciences (PAS), Wroclaw, PL
  - Inst. dei Materiali per Elettronica e Magnetismo, Parma-Fontanini, IT
  - Inst. Nazionale di Ricerca Metrologica (INRIM), Torino, IT
  - International Physics Center, Donostia University, ES
  - Istituto Nazionale per la Fisica della Materia (INFN-LAMIA), Dipartimento di Fisica, Politecnico di Torino, IT
  - Istituto Nazionale per la Fisica della Materia, CNR, Trieste, IT
  - Lab. de Physique des Solides, Faculté des sciences d'Orsay, Université Paris XI, FR
  - Lab. de Physique des Solides, Université d'Orsay, Paris, FR
  - Lab. de Physique Théorique des Liquides, Université Pierre et Marie Curie/CNRS, Paris, FR
  - Lab. de Physique Théorique et Modèles Statistiques (LPTMS), CNRS/Paris XI Université, FR
  - Lab. de Physique Théorique, Université Paul Sabatier, Toulouse, FR
  - Lab. des Matériaux Physiques de Grenoble, FR
  - Laboratory of Applied and Solid State Physics, University of Groningen, NL
  - London Center for Nanotechnology, University College London, GB
  - Max Planck Inst. for Chemical Physics, Dresden, DE
  - Max Planck Inst. for Metal Research, Stuttgart, DE
  - Max-Planck-Inst. für Polymerforschung, Mainz, DE
  - Naval Research Lab., theory group, Washington, US
  - Physics Dept., Columbia University, New York, US
  - Physics Dept., University of Massachusetts, Amherst, US
  - Research Inst. for Solid State Physics and Optics, University of Budapest, HU
  - Rutherford Appleton Laboratory, ISIS Innovation Ltd, University of Oxford, GB
  - School of Chemical and Physical Sciences, Victoria University, Wellington, NZ
  - School of Physics and Astronomy, University of Birmingham, GB
  - School of Physics and Astronomy, University of St. Andrews, GB
  - Spallation Neutron Source (SNS), Oak Ridge National Laboratory, US
  - The Weizmann Inst. of Science, Rehovot, IL
  - Theoretical Physics Research, University of Birmingham, GB
- Economy / Industry**
- ABB Switzerland Ltd Corporate Research, Baden, CH
  - Bruker BioSpin AG/ Bruker Optics GmbH, Fällanden, CH
  - IBM Research Laboratory GmbH, Rüschlikon, CH
  - MecSens SA, Carouge, CH
  - METROLAB Instruments SA, Geneva, C
  - Microsoft Research, Santa Barbara, US
  - Phasis Sàrl, Plan-les-Ouates, CH
  - ROLEX SA, Genève, CH
  - SwissNeutronics, Klingnau, CH
  - Toyota Research & Development, Nagoya, J
- Others**
- Feasibility project CTI, Geneva, CH

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	4 750 000	4 750 000	4 750 000	4 750 000	19 000 000	32
Self-funding from home institution <sup>1</sup>	974 456	1 154 795	1 154 795	1 125 060	4 409 106	7
Self-funding from project participants	9 011 086	8 139 789	8 139 789	5 943 736	31 234 400	52
Third-party funding	1 695 660	1 352 514	1 352 514	981 185	5 381 873	9
<b>Total</b>	<b>16 431 202</b>	<b>15 397 098</b>	<b>15 397 098</b>	<b>12 799 981</b>	<b>60 025 379</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	FR	IT	RU	NL	
Management	4.60	6	40	9	60	13	0	2	3	0	1	2
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	84	14	17	70	83	29	13	7	6	1	2	27
Postdoctoral students	55	11	20	44	80	7	6	9	3	3	2	29
Research associates	0	0	0	0	0	0	0	0	0	0	0	0
Senior researchers <sup>4</sup>	105	8	8	97	92	47	12	10	8	8	2	27
Other staff	19	4	21	15	79	10	2	1	6	0	1	3
<b>Total</b>	<b>267.60</b>	<b>43</b>	<b>15</b>	<b>235</b>	<b>85</b>	<b>106</b>	<b>33</b>	<b>29</b>	<b>26</b>	<b>12</b>	<b>8</b>	<b>88</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 3 project has been funded by CTI at a total amount of 2.8 million CHF.

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

### Members of the Review Panel

Leiderer Paul, Prof. (Chair)  
Claeson Tord, Prof.

Deutscher Guy, Prof.  
Hallberg Karen, Prof.  
Larbalestier David, Prof.  
Raveau Bernard, Prof.

Schlom Darrell G., Prof.  
Siegwart Roland, Prof.  
Vollhardt Dieter, Prof.

### NCCR Office SNSF

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Materials Research Laboratory, Pennsylvania State University, US  
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# Nanoscale Science – Impact on Life Sciences, Sustainability, Information and Communication Technologies

## NCCR Nanoscale Science

### Home Institution

University of Basel

### Start of the NCCR

June 1, 2001

### NCCR Management

#### Director

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### Web Address

[www.nccr-nano.org](http://www.nccr-nano.org)

### Research

#### Module “Nanobiology”

Head: Engel A., Aebi U.

#### Endoscopic Nanotools for Diagnosis and Intervention

H: Friederich N., Daniels A. U., Aebi U., Staufer U.

#### High-resolution imaging and nanomanipulation with the AFM

H: Engel A., Aebi U., Lüthi A., Staufer U.

#### Nanomechanics in biology

H: Gerber Ch., Hegner M.

#### Nanomedicine

H: Hunziker P.

#### Dynamics of DNA topoisomerase

H: Klostermeier D.

#### Single cell proteomics

H: Vettiger P., Plückthun A., Engel A.

#### Studies of cytoskeletal filaments by photonic force microscopy

H: Jeney S.

#### Developing Novel Peptide Nanoparticles for Medical Applications

H: Burkhard P., Aebi U.

#### Module “Quantum Computing and Quantum Coherence”

H: Loss D., Ensslin K.

#### Qubit and spintronics (theory)

H: Loss D.

#### Quantum coherence and quantum computing in superconducting nanostructures (theory)

H: Bruder C.

#### Experimental manipulation of quantum systems

H: Ensslin K., Salis G., Staufer U.

#### Quantum dot nuclear spins

H: Imamoglu A.

#### Entanglement and coherence in nanostructures

H: Oberholzer S.

#### Coherence in Nanoscale Systems

H: Zumbühl D.

#### Module “Atomic and Molecular Nanosystems”

H: Meyer E., Hug H. J.

#### Magnetic nanosystems and single spin experiments

H: Hug H.

#### Mechanics on the nanometer-scale

H: Meyer E.

#### Direct stencil type lithography

H: Meyer G.

#### Atomistic simulations of nanosystems

H: Goedecker S.

#### Molecular conformations on surfaces

H: Fasel R.

#### Module “Molecular Electronics”

H: Schönenberger C., Jung T.

#### Molecular wires

H: Trbovic J., Forró L.

#### Transport properties of molecular junctions

H: Schönenberger Ch., Calame M.

#### Networks of molecular junctions

H: Calame M., Oelhafen P.

#### Electron Spectroscopy of Single Molecules and Thin-Film Transistors

H: Jung T.

#### Optical Properties of Single Molecules

H: Diederich F.

#### Optical Transport in Plasmonic Systems

H: Martin O.F.

#### Chemical synthesis of functional molecules for optoelectronics

H: Diederich F., Mayor M.

#### Module “Functional Materials by Hierarchical Self-Assembly”

H: Diederich F., Meier W.

#### Functional biomimetic dendrimers

H: Diederich F.

#### Functional nanosystems

H: Jung T., Spillmann H.

#### Self-assembling (bio-) polymers

H: Meier W., Textor M., Klok H.-A.

#### Molecular structures

H: Constable E.

#### Functional surface structures

H: Fromm K., Pfaltz A., Heinzlmann H.

#### Nanocrystals

H: Forró L., Setter N.

#### Module “Nanotechnology and Applications”

H: Gobrecht J., Pieleus U.

#### Nano Argovia projects in Applied Sciences

H: Gobrecht J.

#### Module “Supplementary Research Activities”

H: NCCR Board of Directors

#### Toxicity of Nanoparticles

H: Gehr P.

#### NanoEthics - Deliberating the vision of an emergent nano-science

H: Rehmann-Sutter C., Maasen S.

#### Ethics of Science: A course for scientists provided by the NCCR Nanoscale Science

H: Reiter-Theil S.

### Platforms

#### Education Platform

Supervisor: Meier W.

### Nanocurriculum

#### Bachelor and Master Degree in Nanoscience at University of Basel

H: Meier W.

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## Topics

Nanoscale science's research focuses at the nanometer scale. This is the scale of the matter building blocks, namely, atoms and molecules. Therefore, at this scale the traditional scientific disciplines merge, giving place to a highly interdisciplinary interaction between physicists, chemists, physicians, biologists, pharmacologists, computer scientists and engineers. This is clearly reflected in the very interdisciplinary work carried

out within the NCCR Nanoscale Science, where scientists from different disciplines come together to gain insight in this field and develop further the methods, scientific tools and understanding achieved. The goal of the teams taking part in this network is to come up with outstanding scientific achievements that will secure the position of the NCCR as a leader in the nanoscale science. The different and strongly interconnected

topics covered by the researchers include: Impact of nanoscale science on life sciences and medicine, biology at the nanoscale, molecular machinery and nanorobotics, quantum devices and systems for computing and communication and quantum coherence, nanoscale science at the ultimate limits, nanomaterials ranging from biological systems, carbon-nanotubes to nanoclusters and molecular electronics.

## Public Relations

- News on website
- Electronic Newsletter
- Broadcast by the Swiss National Television on our Center and Research

## Third Party Cooperation

(in progress)

### Programmes

- Frontiers (FP6)
- HYSWITCH
- NanoBio-RAISE)
- Pico-Inside

### Research Institutions

(foreign only)

- Abteilung Molekulare Medizin, Max-Planck-Institut für Biochemie, Martinsried, DE
- Anorganische Chemie, Universität Heidelberg, DE
- Applied and Environmental Chemistry Dept., University of Szeged, HU
- Australian Commonwealth Scientific and Research organization (CSIRO), Melbourne, AU
- Biophysical Chemistry, University of Bonn, DE
- Biophysical Engineering, University of Twente, NL
- Biotechnologisches Zentrum, TU Dresden, DE
- Center for Nanoscience, Ludwig-Maximilians-Universität, Munich, DE
- Center for Spintronics and Quantum Computation, University of California, Santa Barbara, US
- Centre d'Elaboration de Matériaux et d'Etudes Structurales, Centre National de la Recherche Scientifique, Toulouse, FR
- Centre for Research on Adaptive Nanostructures and Nanodevices, Trinity College Dublin, IE
- Consiglio Nazionale delle Ricerche, Istituto per la Sintesi Organica e la Fotoreattività, Bologna, IT
- Dept. de Chimie, Institut de Science et d'Ingénierie Supramoléculaires, Strasbourg, FR
- Dept. of Biochemistry, Duke University, Chapel Hill, US
- Dept. of Biophysical and Electronic Engineering, University of Genoa, IT
- Dept. of Chemistry, Clemson University, US
- Dept. of Chemistry, Lab. II, University of Copenhagen, DK
- Dept. of Chemistry, McMaster University, Hamilton, CA
- Dept. of Chemistry, University of Durham, GB
- Dept. of Chemistry, University of Washington, Seattle, US
- Dept. of Condensed Matter Physics, Josef Stefan Institute, Ljubljana, SI
- Dept. of Molecular and Cellular Interactions, Vrije Universiteit Brussel, BE
- Dept. of Physical Chemistry, University of Mainz, DE

## Heads of Individual Research Projects and Subprojects

Aebi Ueli, Prof.  
Bruder Christoph, Prof.  
Burkhard Peter, Dr.  
Calame Michel, Dr.  
Constable Edwin, Prof.  
Daniels Alma U., Prof.  
Diederich François, Prof.  
Engel Andreas, Prof.  
Ensslin Klaus, Prof.  
Fasel Roman, Dr.  
Forró László, Prof.  
Friederich Niklaus, Prof.  
  
Fromm Katharina, Prof.  
Gerber Christoph, Prof.  
Gobrecht Jens, Prof.  
Goedecker Stefan, Prof.  
Hegner Martin, Dr.  
Heinzelmann Harry, Dr.  
Hug Hans Josef, Prof.  
Hunziker Patrick, PD Dr.  
Imamoglu Atac, Prof.  
Jeney Sylvia, Prof.  
  
Jung Thomas, Dr.  
Klok Harm-Anton, Prof.  
Klostermeier Dagmar, Prof.  
Loss Daniel, Prof.  
Lüthi Anita, PD Dr.  
Maasen Sabine, Prof.  
  
Martin Olivier F, Prof.  
Mayor Marcel, Prof.  
Meier Wolfgang, Prof.  
Meyer Ernst, Prof.  
Meyer Gerhard, Dr.  
Oberholzer Stefan, Dr.  
Oelhafen Peter, Prof.  
Pfalz Andreas, Dr.  
Pieles Uwe, Prof.  
Plückthun Andreas, Prof.  
Rehmann-Sutter Christoph, Prof.  
  
Reiter-Theil Stella, Prof.  
Schönenberger Christian, Prof.  
Salis Gian, Dr.  
Setter Nava, Prof.  
Spillmann Hannes, Dr.  
Staufers Urs, Dr.  
Textor Marcus, Prof.  
Trbovic Jelena, Dr.  
Vettiger Peter, Dr.  
Zumbühl Dominik, Prof.

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- Dept. of Physics, Harvard University, Cambridge, US
- Dept. of Physics, Ohio State University, Columbus, US
- Dept. of Solid State Physics, University of Ulm, DE
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- Inst. of Applied Physics, National Academy of Science of Belarus, Minsk, RU
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- Molecular Parasitology, Walter Reed Army Institute of Research, Silver Spring, US
- Nano Ethics Network, University of Aarhus, DK

## Nanoscale Science – Impact on Life Sciences, Sustainability, Information and Communication Technologies

### NCCR Nanoscale Science

#### Achievements

##### Sustainability of the network of competence and contact to industry

The NCCR network of competence in Nanoscale Science has been intensified and extended to industrial research and development. The Swiss Nanoscience Institute (SNI), being the most important offspring of the NCCR Nanoscale Science, mustered its efforts to combine basic research with applied research. Parallel to the success in the establishment of collaborations with R&D, basic research remains a main pillar of our NCCR Nanoscale Science.

The youngest of our Professors, Dominik Zumbühl, was among the first researchers in Europe to be awarded one of the distinguished European Research Council (ERC) research grants.

##### Scientific Highlights

In a strong collaboration with Prof. Kastner's laboratory at the Massachusetts Institute of Technology, we have achieved results that open the door for unprecedented quantum coherent physics. In collaboration between the University of Basel and the ETHZ, supported by the NCCR Nanoscience, a breakthrough in directing single molecules has been achieved which might be used for applications in artificial photosynthesis and molecular electronics. Synthetic organelles based on

nanometer-sized polymer vesicles have been designed and introduced into cells in a target-specific fashion. Their intact biochemical functionality in the cellular environment has been documented, and their intracellular trafficking has been studied.

Work published in the open access journal PLoS Biology sheds light on the mechanism by which bacteria transfer DNA to other cells, a process which can allow resistance to jump between species of bacteria. Bacteria transfer DNA to other bacteria via a process called 'conjugation.' It's about as close to sexual reproduction as bacteria - which reproduce clonally - can get.

A breakthrough in establishing reliable electrical contacts with molecules could be reported. Most existing experiments rely on the synthesis of functional rod-like molecules with chemical linker groups at both ends to provide strong, covalent anchoring to the source and drain contacts. This approach has proved very successful, providing quantitative measures of single-molecule conductance, and demonstrating rectification and switching at the single-molecule level. This is a significant finding for molecular electronics

##### Know-how and technology transfer

Our Center supports the establishment of and con-

tribution to the development of the initiative i-net BASEL Nano. i-net BASEL Nano's purpose is to offer the key players in Nanoscience and Technology a platform for knowledge exchange, team building and facilitation of the flow of research results in applications for industrial products and processes.

##### Education

The Bachelor and Master curriculum on Nanoscience at the University of Basel have been consolidated and are completely integrated into the Science faculty. We co-organized a Workshop for young researcher on 'Global Challenges and How Nanotechnology can help'.

Advancement of Women: Following a survey conducted among female researchers of our NCCR on the most relevant issues related to gender and work-life balance, we now offer a supplementary family allocation.

##### Communication

Owing to the high public interest on nanotechnology, numerous journalists visited the NCCR Nano to interview its members. A TV-portrait of the NCCR and its Director has been realised by the Swiss National TV for its broadcast on the 22nd February 2009.

Further information see [www.nccr-nano.org](http://www.nccr-nano.org).

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	4 750 000	4 750 000	4 750 000	4 750 000	19 000 000	35
Self-funding from home institution <sup>1</sup>	572 473	587 004	514 764	1 325 758	2 999 999	6
Self-funding from project participants	6 757 564	6 391 783	5 028 826	6 399 651	24 577 824	45
Third-party funding <sup>2</sup>	1 948 656	1 284 659	1 394 214	2 875 662	7 503 191	14
<b>Total</b>	<b>14 028 693</b>	<b>13 013 446</b>	<b>11 687 804</b>	<b>15 351 071</b>	<b>54 081 014</b>	<b>100</b>

Personnel <sup>3</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	FR	CN	IT	PL	
Management	3.45	3	38	5	63	5	2	0	0	0	0	1
Master students	2	0	0	2	100	2	0	0	0	0	0	0
Doctoral students	80	23	29	57	71	25	18	4	2	1	0	30
Postdoctoral students	79	19	24	60	76	12	16	12	7	5	2	29
Research associates	4	1	25	3	75	1	0	0	0	2	0	1
Senior researchers <sup>4</sup>	80	14	18	66	83	39	16	4	2	1	6	19
Other staff	29	6	21	23	79	24	1	0	0	0	0	3
<b>Total</b>	<b>277.45</b>	<b>66</b>	<b>23</b>	<b>216</b>	<b>77</b>	<b>108</b>	<b>53</b>	<b>20</b>	<b>11</b>	<b>9</b>	<b>8</b>	<b>83</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 6 projects have been funded by CTI at a total amount of 4.9 million CHF. In addition there was close collaboration with TOP NANO 21. At least in 25 projects of this programme technology transfer to the NCCR took place.

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

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## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

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Reinhoudt David, Prof.	Faculty of Chemical Technology, University of Twente, NL
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- Physics Dept., Ben-Gurion University, Jerusalem, IL
- Physics Dept., Harvard University, Cambridge, US
- Physics Dept., Massachusetts Institute of Technology, Cambridge, US
- Physics Dept., McGill University, Montreal, CA
- Physics Dept., University of Regensburg, DE
- Physics, University of Liverpool, GB
- Physik / Chemie, Technische Universität Kaiserslautern, DE
- Physik / Chemie, Università di Modena, IT
- School of Chemistry, University of Sydney, AU
- School of Mechanical Systems Engineering, Chonnam National University, Gwangju, KR
- Scuola Normale Superiore, Pisa, IT
- Surface Science Research Centre, University of Liverpool, GB
- Synthetic chemistry group, Max-Planck-Institute for Polymer Research, Mainz, DE
- Theoretical and Computational Biophysics Group, University of Illinois, Urbana-Champaign, US
- Universidad de Castilla-La Mancha, Almaden, ES
- Université Paul Cézanne Aix-Marseille III, Centre Scientifique de Saint Jérôme, Marseille, FR
- Walther-Meissner-Inst., Department of Physics, Ludwig-Maximilians-University of Munich, DE

### Economy / Industry

- Bell Labs, Lucent Technologies, Murray Hill, US
- BioCure (Schweiz) GmbH, Rebstein, CH
- Bühler AG, Uzwil, CH
- Concentris GmbH, Basel, CH
- Corporate Research, BASF, Strasbourg, FR
- IBM Zürich Research Laboratory, Rüschlikon, CH
- JPK-Instruments AG, Berlin, DE
- Molecular Partners AG, Zürich, CH
- MorphoSys AG, Martinsried, DE
- Nanonis GmbH, Zürich, CH
- Nanosurf AG, Liestal, CH
- Nanoworld AG, Neuchâtel, CH
- Novartis Institutes for BioMedical Research (NIBR), Cambridge, US
- NTT Basic Research Laboratories, Atsugi-shi, JP
- Quantum Science Research Group, Hewlett Packard Laboratories, Palo Alto, US
- Schering AG, Berlin, DE
- Sony Deutschland, Materials Science Laboratory, Stuttgart, DE
- Süss Micro Optics, Neuchâtel, CH
- Veeco Instruments Inc., Santa Barbara, US

### Others

- Life Science, Fachhochschule Nordwestschweiz, Muttentz, CH

# Quantum Photonics

## NCCR Quantum Photonics

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Swiss Federal Institute of  
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### Start of the NCCR

July 1, 2001

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### Research

#### Quantum communication

Head: Gisin N.

#### Single photon detectors

H: Zbinden H.

#### Cavity-QED and spin based quantum information processing

H: Imamoglu A.

#### Cavity Quantum Optomechanics

H: Kippenberg T.

#### Ordered pyramidal quantum dots for quantum photonics applications

H: Kapon E.

#### Quantum coherence in semi- conductor nanostructures

H: Deveaud-Plédran B.

#### Time resolved cathodoluminescence

H: Ganière J.D.

#### Theory and modelling of quantum coherence in polaritonic nanodevices

H: Savona V.

#### Nitrides based light emitters

H: Grandjean N.

#### Advanced photonic crystal structures

H: Houdré R.

#### MEMS photonic crystals and gratings

H: Stanley R.

#### Coherent control of matter in photonic crystal fibers

H: Feurer T.

#### Quantum cascade interlevel sources

H: Faist J.

#### Ultrafast sources from near infrared to X-rays

H: Keller U.

#### Imaging applications of second harmonic generation in nanoparticles

H: Psaltis D.

#### XUV-IR Laser Pulse Shaping using MEMS

H: Wolf J.P.

#### Towards directly modulated VCSELs at 40Gbit/s

H: Witzigmann B.

### Technology Platforms, Programmes etc.

#### Industrial Project Program Pochon S.

#### Doctoral programme in quantum photonics Martin O.

#### Tandem Partner Program Pochon S.

#### Summer School & Workshops "Monte Verità, Ascona", "Ovronnaz"

#### Scientific camps for young girls: 7-10 & 11-13 years old Moser F.

### Heads of Individual Research Projects and Subprojects

Deveaud-Plédran Benoît, Prof.

Faist Jérôme, Prof.

Feurer Thomas, Prof.

Ganière Jean-Daniel, Dr.

Gisin Nicolas, Prof.

Grandjean Nicolas, Prof.

Houdré Romuald, Dr.

Imamoglu Atac, Prof.

Kapon Eli, Prof.

Keller Ursula, Prof.

Kippenberg Tobias, Prof.

Psaltis Demetri, Prof.

Savona Vincenzo, Prof.

Stanley Ross, Dr.

Witzigmann Bernd, Prof.

Wolf Jean-Pierre, Prof.

Zbinden Hugo, Dr.

Institut de Photonique et d'Electronique Quantiques, EPF Lausanne

Institut de Physique, Université de Neuchâtel

Institut für Angewandte Physik, Universität Bern

Institut de Photonique et d'Electronique Quantiques, EPF Lausanne

Groupe de Physique Appliquée, Université de Genève

Institut de Photonique et d'Electronique Quantiques, EPF Lausanne

Institut de Photonique et d'Electronique Quantiques, EPF Lausanne

Institut für Quantenelektronik, ETH Zürich

Institut de Photonique et d'Electronique Quantiques, EPF Lausanne

Institut für Quantenelektronik, ETH Zürich

Institut de photonique et d'électronique quantiques, EPF Lausanne

Institut d'imagerie et optique appliqué, EPF Lausanne

Group of Theory of Nanosystems, EPF Lausanne

CSEM Neuchâtel

Institute für Integrierte Systeme, ETH Zürich

Biophotonics Group, University of Geneva

Groupe de Physique Appliquée, Université de Genève

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Erman Marko, Dr. Thales Communication, Orsay, FR

Heffernan Jon, Dr. Sharp Laboratories, Oxford, UK

Kröll Stefan, Prof. Lund Institute of Technology, Sweden

Riechert Henning, Prof. Paul Drude Institut, Berlin, DE

Skolnick Maurice, Prof. University of Sheffield, United Kingdom

Weisbuch Claude University of California, Santa Barbara, USA

## Topics

Since Einstein's famous discoveries in the early 1900s, we know that light exhibits a double nature – it can be considered as both a wave and as a stream of photons. This is the so-called quantum behavior. In the very same way, particles such as electrons bear the same duality. Therefore, at an infinitesimal scale, the interaction of light with matter can be manipulated, revealing novel phenomena that might prove useful.

From this starting point, scientists at the NCCR Quantum Photonics conduct fun-

damental research as well as develop novel technologies that carry the potential for numerous future applications. Such as: Quantum Cryptography guaranteeing transaction security by preventing hackers from intercepting messages transmitted through an optical link. Quantum Cascade Lasers will take part in NASA's Mars Exploration Program, to study the red planet habitability to assess whether Mars ever was, or is still today, an environment able to support microbial life.

For the second phase 2005-2008, we currently have 17 projects covering a wide range of fields such as quantum optics, advanced photonics applications and advanced light sources. Besides oriented research and technology transfer, the NCCR Quantum Photonics also supports workshops and scientific camps for 11-13 year old girls demonstrating that mathematics and physics are rewarding. These activities promote and strengthen long-term excellence in the field of photonics in Switzerland.

## Achievements

### Research results

The Quantum Photonics NCCR allows strengthening the quality of research in the field in Switzerland, with outstanding scientific achievements. Since the beginning of the NCCR, more than 850 papers have appeared in scientific journals and more than 850 conference presentations have been given by scientists of the different teams. To select just a few, the NCCR is proud of the following ones: The NCCR QP has organized in 2008 major events in the research field, in January 2008 the Latsis symposium prize was granted to the NCCR QP and a conference on: "Bose Einstein Condensation in dilute atomic gases and in condensed matter". Professor Nicolas Grandjean organized the International Workshop on Nitride semiconductors Conference in Montreux in October 2008.

### European collaborations

The European Research Council announces the first successful candidates in the ERC Advanced Grants competition in the domain Physical Sciences and Engineering. Over 997 applica-

tions, 105 have been successful, Switzerland received 9 of them. The NCCR Quantum Photonics is pleased to announce that two Project Leaders: Prof. Atac Imamoglu and Prof. Nicolas Gisin are amongst the winners. NCCR research groups are actively involved in 20 Projects sponsored by the European Community, that are a strong foundation for the future of Photonics in Switzerland and for the European Research and Development Programmes: FP7

### Spin-offs and Technology Transfer

Many Spin-off companies have been created by NCCR Scientists: AlpesLasers, BeamExpress, IDQuantique, Timebandwidth and recently the start up Attolight has been founded, a new project sponsored by an EPFL Inno-grant. The exchanges between the NCCR and the Start-ups / Small and Medium Enterprises (SME) create new ideas, allow experience sharing and develop market oriented spirit. Moreover bridging the gap between the fundamentally oriented research carried out within the NCCR and the industrial world has been

achieved with the financing of small industrial projects: 9 projects are running, already showing excellent results. Finding matching funds from Industry or support organizations is worth while.

### Education and Knowledge transfer, Adv of Woman

The Photonic Doctoral School is developing a "Tandem Partner Program" allowing PhD's from all over Switzerland to share and exchange their scientific experience. Strong collaboration with the Equal Opportunity Office and the NCCR MICS allows us to leverage on existing initiatives to promote women and youngsters in the scientific world through tangible actions: 6 scientific camps are organized each year, industry visits, networking events and invited guest's seminars. The "Polythèque" has been created in order for youngsters to get in touch with scientific medias, to learn and to ask questions around afternoon themes... Nevertheless a Science Bus will be launched on the road to improve the contact with the population, and bring science to the people.

Further information see <http://nccr-qp.epfl.ch>

## Third Party Cooperation (in progress)

### Programmes

- COST
- COST MP0702
- COST288
- COST299
- COSTP11
- CTI 8552.1:2 NMPP-NM
- CTI/KTI
- CTI-PHOTODOT
- EPIXNET
- EU CA-QUROPE
- EU IP SECOQC 2004-2008
- EU-ANSWER
- EU-MOSEL
- IST-VISTA
- NITWAVE
- SNF and DFG
- STIMSCAT
- STREP-Sinphonia
- Teramobile
- ULTRAGAN

### Research Institutions

(new cooperations since 2005 only)

- Advanced Technology and Nanoscience (TASC), Trieste, IT
- Applied Physics Integrated Optics Group, Paderborn University, DE
- Centre des Technologies de l'Information, Geneva, CH
- Centre d'Etudes de Saclay, CEA, Gif-sur-Yvette, FR
- Centre d'Etudes de Saclay, CEA-SPAM, Gif-sur-Yvette, FR
- Centre for Quantum Technologies, National University of Singapore, SG
- Clarendon Lab., University of Oxford, GB
- Département de physique, Université de Neuchâtel, CH
- Dept. of Applied Physics, Stanford University, Palo Alto, US
- Dept. of Chemistry, Massachusetts Inst. of Technology (MIT), Boston, US
- Dept. of Physics and Astronomy, Cardiff University, GB
- Dept. of physics, University of Torino, IT
- Dip. Fisica della Materia e Tecnologia Fisiche Avanzate, Università Messina, IT
- Dip. di Fisica A. Volta, University of Pavia, IT
- EMPA, Dübendorf, CH
- Foundation for Fundamental Research on Matter (FOM), Amsterdam, NL
- High Pressure Materials Synthesis Group, Swiss Federal Inst. of Technology Zurich (ETHZ), CH
- Inst. für Physik, Theoretische Physik, Humboldt University of Berlin, DE
- Inst. für Physikalische Chemie, University Wuerzburg, DE

- Inst. of Photonic Science, University of Barcelona, ES
- Inst. of Technology, University of Lund, DK
- Lab. de Chimie de la matière condensée de Paris, Ecole Nationale de Chimie de Paris, FR
- Lab. de physique des nanostructures, Swiss Federal Institute of Technology Lausanne (LPN-EPFL), Lausanne, CH
- Lab. d'Etude des Microstructures, l'Office national d'études et recherches aérospatiales (ONERA), Chatillon, FR
- Lab. en semiconducteurs avancés pour la photonique et l'électronique, Swiss Federal Inst. of Technology Lausanne (LASPE-EPFL), CH
- L'Inst. de Photonique et d'Électronique Quantiques (IPEQ), Swiss Federal Inst. of Technology (EPFL), Lausanne, CH
- Matériaux et Phénomènes Quantiques, University of Paris Diderot (MPQ), FR
- Photonics and Semiconductor Nanophysics, University of Technology Eindhoven, NL
- Physics Dept., Université de Genève, CH
- Quantum Optics, Institute of Photonic Sciences, (ICFO), Barcelona, ES
- Unité de Formation et de Recherche en Physique, Université Claude Bernard Lyon1, FR

#### Economy / Industry

- Aerodyne Research Inc, Billerica, US
- Alpes Lasers SA, Neuchâtel, CH
- Attolight Sarl, Lausanne, CH
- Beamexpress, Lausanne, CH
- Dätwyler/Silitec, Boudry, CH
- Daylight Solutions, Poway, US
- Delong Instruments a.s., Brno, CZ
- Exalos AG, Schlieren, CH
- EXFO Inc., Ontario, CA
- HP International, Geneva, CH
- HP, Bristol, GB
- Id Quantique SA, Geneva, CH
- Lab. Optique Electronique Appliquée (OPEA), Vincennes, FR
- Lasag Inc, Thun, CH
- Lovalite, Bezancon, FR
- METAS Swiss Federal Office for Metrology, Bern, CH
- METAS Swiss Federal Office for Metrology, Regensburg, CH
- Namiki Precision Jewel Co., Tokyo, JP
- Partner Y, Confidential Information, FR
- Rolex SA, Geneva, CH
- Swisscom Group, Geneva, CH
- ZODIAC, Marcoussis, FR

### Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	5 200 000	4 000 000	3 600 000	3 200 000	16 000 000	34
Self-funding from home institution <sup>1</sup>	2 266 363	3 048 423	1 393 934	129 700	6 838 420	15
Self-funding from project participants	4 674 179	6 181 281	3 770 002	3 784 000	18 409 462	40
Third-party funding <sup>2</sup>	859 634	3 041 753	1 061 158	325 400	5 287 945	11
<b>Total</b>	<b>13 000 176</b>	<b>16 271 457</b>	<b>9 825 094</b>	<b>7 439 100</b>	<b>46 535 827</b>	<b>100</b>

Personnel <sup>3</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							FR	IT	DE	IL	US	
Management	3.20	6	60	4	40	8	2	0	0	0	1	0
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	65	11	17	54	83	17	6	6	12	0	0	26
Postdoctoral students	34	4	12	30	88	8	6	7	2	0	3	8
Research associates	1	1	100	0	0	1	0	0	0	0	0	0
Senior researchers <sup>5</sup>	65	6	9	59	91	29	12	8	4	6	2	14
Other staff	35	19	54	16	46	30	1	3	0	0	0	4
<b>Total</b>	<b>203.20</b>	<b>47</b>	<b>22</b>	<b>163</b>	<b>78</b>	<b>93</b>	<b>27</b>	<b>24</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>52</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 7 projects have been funded by CTI at a total amount of 8,5 million CHF.

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

### Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

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**Ebeling Karl Joachim, Prof.**  
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# Interactive Multimodal Information Management NCCR IM2

## Research

### Audio processing

Head: Dines J.

### Database management and access

H: Popescu-Belis A.

### Visual/video processing

H: Thiran J.-P.

### Multimodal processing and recognition

H: Billard A.

### Multimodal context abstraction

H: Marchand-Maillet S.

### Human-machine integration

H: Lalanne D.

## Platforms, Programmes etc.

### Doctoral School

Supervisor: Bourlard H.  
Co-Supervisor: Ebrahimi T.  
Female Fellowship: Bourlard H.

### Visitor exchange program with ICSI, Berkeley, US

Supervisor: Bourlard H.

### Smart Meeting Room

Supervisor: Bourlard H.

### Multimedia File Server

Supervisor: Popescu-Belis A.

## Heads of Individual Research Projects

Billard Aude, Prof.

Dines John, Dr.

Lalanne Denis, Dr.

Marchand-Maillet Stéphane, Dr.

Popescu-Belis Andrei, Dr.

Thiran Jean-Philippe, Prof.

LASA, EPF Lausanne

Idiap, Martigny

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Centre Universitaire d'Informatique, Université de Genève

Idiap, Martigny

Signal Processing Institute, EPF Lausanne

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van Gool Luc, Prof.

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IM2 Deputy Director, EPFL

University of Bern

Vice-rector of the University of Fribourg

Vice-dean of the Faculty of Sciences of the University of Geneva

ETHZ, Katholieke Universiteit Leuven (B)

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Rigoll Gerhard, Prof.

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Oviatt Sharon, Prof.

Pelachaud Catherine, Prof.

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University of Edinburgh (UK)

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IUT de Montreuil, Université Paris 8 (FR)

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## Public Relations

- Newsletter IM2, www.im2.ch
- IM2 Flyer
- Festival "Science et Cité" 2005
- Brochure IM2
- Public Day at the "Foire du Valais"
- "Let's talk about your future"

## Third Party Cooperation

(in progress)

### Programmes

- BACS (EU-FP6)
- BioSecure
- BioSecure
- CHIRON (EU-FP6)
- COBOL
- COST 2101
- COST BM0601
- DIRAC (EU-FP6)
- ERGOMIND (EU-FP7)
- MOBIO (EU-FP7)
- NeuroMath (COST)
- PetaMedia (NoE EU-FP7)
- SCOVIS (EU-FP7-ICT)
- SIMILAR
- TACT (EU-FP6)
- TOBI (EU-FP7)
- URUS (EU-FP6)
- VISMATER  
(EC FP7 Coordination Action)

### Research Institutions

- Center for Vision, Speech and Signal Procession, University of Surrey, Guildford, GB
- Dept. of computing, University of Lancaster, GB
- Dept. of Informatics, University of Zurich, CH
- Dept. of Physiology, University of Arizona, Tucson, US
- Dept. of Signal Theorie and Communications, Universitat Politècnica de Catalunya, Barcelona, ES
- Ecole d'ingénieurs de Genève (EIG), CH
- Ecole d'ingénieurs et d'architectes de Fribourg, CH
- French Ministry of Research and Education, University of Avignon, FR
- Haute Ecole d'Ingénierie et de Gestion du Canton de Vaud (HEIG-VD), Yverdon, CH
- Hautes Ecoles Spécialisées de Suisse Occidentale (HES-SO), Sion, CH
- Laboratoire d'Informatique pour la Mécanique et les Sciences de l'Ingénieur (LIMSI), CNRS, Paris, FR
- NCCR Affective Sciences, Geneva, CH
- Visual Information Processing for Enhanced Retrieval (VIPER), University of Geneva, CH

## Topics

The National Center of Competence in Research (NCCR) on Interactive Multimodal Information Management, in short IM2, is concerned with the development of natural multimodal interfaces for human-computer interaction. By “multimodal”, we mean the different technologies that coordinate natural input modes (such as speech, pen, touch, hand gestures, head and body movements, and eventually physiological sensors) with multimedia system output (such as speech, sounds, and images). Ultimately, these multimodal interfaces should flexibly accommodate a wide range of users, tasks, and environments for which any single mode may not suffice.

The field of multimodal interaction thus covers a wide range of critical activities and applications, including recognition and interpretation of spoken, written and gestural language, particularly when used to interface with multimedia information systems, and biometric user authentication (protecting information access). As addressed by IM2, management of multimedia information systems is a wide-ranging and important research area that includes not only the multimodal interaction described above, but also multimedia docu-

ment analysis, indexing, and information retrieval. The development of this technology is necessarily multi-disciplinary, requiring the collaborative contributions of experts in engineering, computer science, linguistics and, more recently, in social sciences and psychology.

As a particular kind of complex multimodal interaction, and to foster collaboration, IM2 decided to focus on the common vision of “computer-enhanced human-to-human interaction” and, more specifically, on the analysis, understanding and retrieving of face-to-face and remote (videoconferencing) multimodal meeting data. Indeed, understanding human-human interaction is fundamental to the long-term pursuit of powerful and natural multimodal interfaces for human-computer interaction. In addition to better understanding of group processes, our progresses in language and video processing, multimedia indexing, as well as the advanced tools for working with multimodal data, will improve research and development in numerous related areas.

In this context, IM2 thus aims to enhance the value of multimodal meeting recordings and to make human interaction more effective in real time. These

goals will be achieved by developing new tools for computer supported cooperative work and by designing new ways to search and browse meetings as part of an integrated multimodal group communication, captured from a wide range of devices. Several technology prototypes, able to record meetings and to automatically generate searchable multimedia meeting archives are now available and some of the resulting technologies are being exploited by IM2 spin-offs or have been adopted by companies working in the multiple fields of Information and Communication Technology (ICT), including, e.g., video-conferencing and meeting facilitation.

The IM2 NCCR, headed by the Idiap Research Institute in Martigny, combines many partners from a number of university institutions (EPFL, ETHZ, University of Geneva, University of Fribourg, and University of Bern), the HES (Universities of Technology) of Fribourg, Sion and Sierre, and a range of commercial companies. The NCCR also has numerous international contacts, including an agreement for the exchange of young researchers with the International Computer Science Institute (ICSI) in Berkeley, California.

## Achievements

### Multimodal Processing

IM2 has significantly contributed to the development of a new research field referred to as multimodal processing, which is now viewed as increasingly important at the international level. IM2 is also recognised worldwide for its contributions in related areas such as speech and language understanding, computer vision, multi-channel processing and fusion, and multimedia indexing.

### Meeting Recordings

IM was among the first projects worldwide to focus on multimodal meeting recordings, which is now attracting more and more attention. IM2 thus works on large multimodal meeting databases, and makes them available to the scientific community. IM2 is not only significantly contributing to the field, but is also in a good position to set up international research and development standards.

### Knowledge Dissemination/Technology Transfer

In addition to new university courses and doctoral programs, IM2 was also among the initiators of the series of international Multimodal Interaction and

Related Machine Learning Algorithms (MLMI) workshops. In 2008, it also initiated a joint summer institute in collaboration with the Affective Sciences NCCR, already resulting in new collaboration.

In terms of technology transfer, IM2 also fostered the creation of several start-up companies, such as Spiderphone, Anteleon Imaging, Klewel, Kooaba, Keylemon. Thanks to IM2, Idiap Research Institute and its subsidiary IdeArk S.A. are a core component of the new Economic Development strategy of the Canton of Valais.

### Young and Female Researchers

The exchange programme supported by IM2 helped create a privileged relationship between Swiss institutions, researchers and the International Computer Science Institute (ICSI) in Berkeley/USA. IM2 has made significant efforts to increase the visibility of women active in science (public events, publications, meeting recordings). IM2 supported (until 2007) a successful Female Fellowship programme aimed specifically at boosting the careers of female researchers.

### Structural Impact

IM2 is having a strong and visible structural impact in several of the IM2 institutions. Based on its growing reputation, Idiap is now recognized by SER (Federal Government) as part of a "strategic alliance with the EPF-ETH domain" (since January 2008). This came with a joint, Idiap-EPFL development plan (signed July 2008), involving common research activities, development of a common doctoral program and including the provision for 2 to 3 new joint EPFL/Idiap assistant professor tenure track positions. In addition, the Individual Project in Brain machine Interaction yielded the creation of a new chair at EPFL. New (assistant) professor positions directly related to IM2 were created at ETHZ and University of Geneva. Finally, the University of Fribourg is seriously considering the creation of a new "institute" (HumanIST) directly leveraging on IM2 activities. Several of the IM2 partners have an excellent integration in the ERA (European Research Area) as key partners in, and often coordinators of, several key FP6 and FP7 projects.

Further information see [www.im2.ch](http://www.im2.ch)

### Economy / Industry

- Alro Engineering SA, Martigny, CH
- Alto-Service, Vufflens le Château, CH
- Atonce Capital Management AG, Bätterkinden, CH
- Cinetis SA, Martigny, CH
- Deutsche Telekom Laboratories, Berlin, DE
- EyeP Media SA, Yverdon, CH
- Fastcom Technology SA, Lausanne, CH
- IBM TJ Watson Research Center, New York, US
- Intel Corp., Santa Clara, US
- Invacare International, Gland, CH
- KeyLemon, Martigny, CH
- Kooaba AG, Zürich, CH
- Memoria, Sion, CH
- MHT Optic Research AG, Niederhasli, CH
- Microsoft, Lausanne, CH
- NASA, Ames Research Center, Moffett Field, US
- Nestlé Research Center, Vevey, CH
- NEXThink S.A, Fribourg, CH
- Odermatt AG, Hunzenschwil, CH
- Odysis SA, Lausanne, CH
- Procedural AG, Zürich, CH
- Qualcomm Inc, San Diego, US
- Sowoon Technologies Sàrl, St-Imier, CH
- SVOX AG, Zürich, CH
- Telecontrol, Pully, CH
- Veovox, Pully, CH

### Others

- Armaswiss, Bern, CH
- HASLER Foundation, Bern, CH
- HASLER Foundation, Fribourg, CH
- HASLER Foundation, Geneva, CH
- HASLER Foundation, Martigny, CH

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	3 500 000	3 500 000	2 800 000	2 100 000	11 900 000	38
Self-funding from home institution <sup>1</sup>	789 019	934 189	1 461 278	755 210	3 939 696	13
Self-funding from project participants	1 962 398	1 752 623	1 623 887	597 500	5 936 408	19
Third-party funding <sup>2</sup>	1 935 388	2 520 036	3 552 122	1 340 812	9 348 358	30
<b>Total</b>	<b>8 186 805</b>	<b>8 706 848</b>	<b>9 437 287</b>	<b>4 793 522</b>	<b>31 124 462</b>	<b>100</b>

Personnel <sup>3</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							FR	IN	IT	US	RO	
Management	10.40	6	40	9	60	12	0	0	0	1	0	2
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	85	22	26	63	74	27	10	12	5	1	6	28
Postdoctoral students	28	7	25	21	75	4	2	0	5	1	1	15
Research associates	2	0	0	2	100	1	0	0	0	0	0	1
Senior researchers <sup>5</sup>	45	8	18	37	82	13	7	3	3	7	4	20
Other staff	24	1	4	23	96	15	5	0	0	2	0	1
<b>Total</b>	<b>194.40</b>	<b>44</b>	<b>22</b>	<b>155</b>	<b>78</b>	<b>72</b>	<b>24</b>	<b>15</b>	<b>13</b>	<b>12</b>	<b>11</b>	<b>67</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 17 projects have been funded by CTI at a total amount of 9.3 million CHF.

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

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# Computer Aided and Image Guided Medical Interventions

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### Research

**Real-time sensor fusion and 3D model update for minimally invasive surgery**

Head: Baur C.  
Blanc R., Zheng G.

**Magnet-resonance image-guided radio-frequency ablation of liver tumors**

H: Becker C.  
Blanc R., Kuster N., Székely G., Terraz S.

**Computer-aided surgery around the head**

H: Caversaccio M.  
Zheng G., Weber S.

**Virtual-reality based training of medical procedures**

H: Harders M.  
Bajka M., Bleuler H., Gantert W., Gross M., Thaler M., Rudin M., Szczerba D., Müller B.

**Image-guided neurosurgery – neurosurgical treatment of functional brain disorders**

H: Jeanmonod D.  
Martin E., Morel A., Székely G., Kiper D., Werner B.

**Load sensing surgical instruments and implants**

H: Ryser P.  
Hierold C., Jacq C., Kowal J., Maeder T., Neuenschwander J., Sennhauser U., Koch V.

**Interactive clinical visualisation for joint examination**

H: Magnenat-Thalmann N.  
Ferguson S., Hoffmeyer P., Siebenrock K., Thalmann D.

**Advanced image guided surgical interventions in ophthalmology**

H: Nelson B.  
Kowal J., Büchler P., Kratochvil B.

**Soft-tissue modelling: from mechano-biology to real-time simulation**

H: Ferguson S.  
Baur C., Gross M., Kroschewski R., Koumoutsakos P., Mazza E., Büchler P., Poulikakos D.

**Computer assistance in orthopaedic surgery**

H: Reyes Aguirre, M.  
Chopard B., Rüfenacht D., Székely G., Zheng G., Büchler P., Thali M.

**Diagnosis patient-specific flow simulation and advanced wessel wall analysis**

H: Alkadhi H.  
Kurtcuoglu V., Blanc R.

**Systems face: Computer aided treatment of facial diseases**

H: Zeilhofer H.-F.  
Caversaccio M., Gross M., Kuttenger J., Sader R., Schwenzer Zimmerer K., Vetter T., von Rechenberg B.

**Semiautomatic coronary anastomosis using cobra and helical needle concept**

H: Zünd G.,  
Van de Venn H.

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Micro- und Nanosysteme, ETH Zürich  
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## Third Party Cooperation

(in progress)

### Programmes

- KTI Nr. 7961.2
- KTI Nr. 8075.1
- KTI Nr. 8173.1
- KTI Nr. 7812.2
- KTI Nr. 8558.1
- KTI Nr. 8059.2
- Research Funding Award Program
- KTI Nr. 9193.1
- ARES (FP6)
- ImmerSence IST (FP6)
- Marie Curie Actions (FP6)

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- BG- Unfallklinik, Frankfurt a.M., DE
- BG- Unfallklinik, Ludwigshafen, DE
- Biox and Artificial Intelligence Lab, Stanford University, San Francisco, US
- Brigham and Women's Hospital, Harvard Medical School, Boston, US
- Center for Integration of Medicine and Innovative Technology (CIMIT) Simulation Group, Boston, US
- Center for Processing Speech and Images, Catholic University, Leuven, BE
- Center of Advanced European Studies and Research (CAESAR), Bonn, DE
- Christian-Doppler-Klinik, Salzburg, AT
- CMF Division, Medical University Warsaw, Katowice, PL
- Daniel den Hoed Cancer Center, Erasmus University, Rotterdam, NL
- Dépt. de Neurochirurgie, CHUV, Lausanne, CH
- Dept. of Computer Science and Engineering, Nagoya University, JP
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ARTORG Center for Biomedical Engineering Research,  
Universität Bern

Klinik für Herz- und Gefässchirurgie, Universitätsspital Zürich

## Topics

The fundamental target of this NCCR is to understand, realise, and demonstrate the potential, which information technology offers for the optimisation of medical interventions in order to improve the treatment of individual patients and overall health care

for society as a whole. The focus of the NCCR is on the development, integration and validation of enabling technologies towards advanced computer aided, image guided systems for medical interventions that support the complete treatment process

from therapeutic planning and simulation via intra-operative action to post-operative care, monitoring and documentation. In addition, the utility of the underlying strategies and concepts for novel forms of medical education and training is being explored.

## Achievements

### Basic and applied research

Major advances achieved in biomedical simulation allow modelling the complex behaviour of living human tissue. Numerous applications have been developed for the optimal support of a variety of medical interventions by functional pre-operative planning, as well as for offering realistic skill training environments for surgical residents using high-fidelity training simulators. For surgical navigation, different devices have been realised including a small, cost-saving optical tracking system marketed by our spin-off Atracsys. Another highlight for the integration of advanced sensor technology into surgical environment is the intra-

operative force-measuring device supporting balancing the ligaments during total knee arthroplasty. A recent initiative on sensor integration into orthopaedic instruments and implants is further advancing precise intra-operative support and post-operative follow-up. Force feedback for improving medical diagnosis, therapy, and education belongs to the main areas of competence.

### Technology transfer

The close cooperation between research labs and clinical sites guarantees the effective transfer of scientific results to patient care, demonstrated by numerous patent applications and spin-offs as well as collaborations with global market leaders in

computer-aided surgery including BrainLAB.

### Advancement of women

The scientific career of female clinicians is supported every year by a research grant. The organisation of the annual research-networking workshop is headed by female PhD-students.

### Education and Training

The members of the NCCR play a decisive role in creating new Master Curricula: Master of Science in Biomedical Engineering (University of Berne) – with the focus areas Musculoskeletal System and Microsensor and Actuator Technology – and inter-departmental Master of Biomedical Engineering (ETH Zurich).

- Inst. for Rapid Product Development, University of Applied Science, St. Gallen, CH
- Klinik für Plastische Chirurgie, Klinikum rechts der Isar der TU München, DE
- MeVis, Zentrum für Medizinische Diagnosesysteme und Visualisierung, Bremen, DE
- Microsoft Research, Cambridge, GB
- Paul Scherrer Inst., Villigen, CH
- Poliklinik für Kieferorthopädie, Ludwig Maximilians-Universität, München, DE
- Precision and Intelligence Lab. at Tokyo Institute of Technology, Tokyo, JP
- Robotics Lab, Stanford University, US
- School of Electrical and Computer Engineering, Georgia Inst. of Technology, Atlanta, US
- Virginia Modeling, Analysis and Simulation Center (VMASC) at Old Dominion University, Norfolk, US

### Economy / Industry

- ABW GmbH, Frickenhausen, DE
- Atracsys SARL, Bottens, CH
- B. Braun Medical AG, Sempach, CH
- Boston Scientific Corporation, Natick, US
- BrainLAB AG, Feldkirchen, DE
- BrainLAB AG, Heimstetten, DE
- Camlog Holding AG, Basel, CH
- Celon AG, Teltow, DE
- Cochlear AG, Lausanne, CH
- Codman Neuro Sciences Sàrl, Le Locle, CH
- Ethicon GmbH (Johnson & Johnson), Norderstedt, DE
- Ethicon Medical Ltd. - Women's Health and Urology, Neuchâtel, CH
- Force Dimension, Lausanne, CH
- Fotona, Ljubljana, SI
- fssb Chirurgische Nadeln GmbH, Jestetten, DE
- General Electric Health Care, Milwaukee, US
- Gesellschaft für optische Messtechnik mbH, Braunschweig, DE
- H. Häberli AG, Grenchen, CH
- Hansen Medical, Palo Alto, US
- Image Guided Therapy SA, Pessac, FR
- Imricor Medical Systems, Inc., Burnsville, US
- InSightec - Image Guided Treatment Ltd., Tirat Carmel, IL
- Kontron Medical AG, Basel, CH
- Kuros Biosurgery AG, Zürich, CH
- Leica Microsystems AG, Glattbrugg, CH
- Materialise GmbH, Oberpfaffenhofen, DE
- Maxon Motor AG, Sachseln, CH

# Computer Aided and Image Guided Medical Interventions

## NCCR CO-ME

- Medelec Minimeca SA, Puidoux, CH
- Medtronic Suisse SA, Tolochenaz, CH
- MeVis Research GmbH, Bremen, DE
- Minolta GmbH, Langenhagen, DE
- Mobile Manufacturer Forum, Bruxelles, BE
- Philips Medical Systems, Best, NL
- Philips Medical Systems, Zürich, CH
- Polymed Medical Center, Glattbrugg, CH
- Proform AG, Marly, CH
- Richard Wolf GmbH, Knittlingen, DE
- SARIX SA, Losone, CH
- Siemens AG, Erlangen, DE
- Siemens AG, Medical Solutions, Erlangen, DE
- Sinus-Point AG, Welschenrohr, CH
- SMD Strain Measurement Devices, Bury St Edmunds, GB
- Speag (Schmid & Partner Engineering AG), Zürich, CH
- Steinbichler Optotechnik GmbH, Neubeuern, DE
- Stryker Trauma AG, Selzach, CH
- Synthes AG, Oberdorf, CH
- Treier Endoscopie AG, Beromünster, CH
- Unimed SA, Lausanne, CH
- xitact SA, Morges, CH
- ZMT Zurich MedTech AG, Zürich, CH

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- Bundesminister für Umwelt, Naturschutz und Reaktorsicherheit, Bonn, DE
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- M.E. Müller-Stiftung, Bern, CH
- Mobile Manufacturers Forum (MMF), Group Special Mobile (GSMA), Bruxelles, BE
- National Institute of Environmental Health Sciences (NIEHS), Research Triangle Park, US
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## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	4 000 000	4 000 000	4 000 000	4 000 000	16 000 000	35
Self-funding from home institution <sup>1</sup>	2 144 085	2 010 100	1 556 236	3 253 228	8 963 649	20
Self-funding from project participants	3 872 863	4 191 544	3 476 751	3 045 954	14 587 112	32
Third-party funding <sup>2</sup>	1 165 326	1 886 437	1 385 347	1 299 977	5 737 087	13
<b>Total</b>	<b>11 182 274</b>	<b>12 088 081</b>	<b>10 418 334</b>	<b>11 599 159</b>	<b>45 287 848</b>	<b>100</b>

Personnel <sup>3</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	FR	ES	TR	AT	
Management	4.51	4	44	5	56	7	2	0	0	0	0	0
Master students	4	1	25	3	75	4	0	0	0	0	0	0
Doctoral students	70	13	19	57	81	25	16	2	3	5	1	18
Postdoctoral students	25	1	4	24	96	6	6	3	2	0	0	8
Research associates	32	3	9	29	91	25	2	2	0	0	2	1
Senior researchers <sup>5</sup>	110	13	12	97	88	49	43	2	2	0	2	12
Other staff	20	12	60	8	40	17	1	0	0	1	0	1
<b>Total</b>	<b>265.51</b>	<b>47</b>	<b>17</b>	<b>223</b>	<b>83</b>	<b>133</b>	<b>70</b>	<b>9</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>40</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 15 projects have been funded by CTI at a total amount of 18,2 million CHF

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

### Members of the Review Panel

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# Mobile Information and Communication Systems

## NCCR MICS

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### Start of the NCCR

November 1, 2001

### NCCR Management

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### Public Relations

- Web site
- Bimonthly newsletter

### Research

#### Cluster "Theory of Self-Organized, Distributed Communication and Information"

Head: Urbanke R.

#### Information and coding theory for wireless multi-hop networks

Diggavi S., Telatar E.,  
Urbanke R.

#### Network theory for wireless multi-hop networks

Diggavi S., Grossglauser M.,  
Telatar E., Thiran P.

#### Distributed signal processing and communication in sensor networks

Vetterli M.

#### Algorithmic foundations of ad hoc and sensor networks

Wattenhofer R., Widmayer P.

#### Sensorscope and its application to environmental monitoring

Parlange M., Vetterli M.

#### Reliable computing in sensor networks

Guerraoui R.

#### Cluster "Mobile Communication and Processing Platforms"

H: Le Boudec J.-Y.

#### Very low radiated power UWB communication

Le Boudec J.-Y.,  
Decotignie J.-D., Dehollain C.,  
Robert S., Skrivervik A.,  
Wittneben A.

#### Deployment of sensor networks

Mattern F., Thiele L.

#### Modular and composable platform for sensor and actuator networks

Henzinger T., Thiele L.

#### Application: Distributed odour source localization using a miniature multi-robot system

Martinoli A.

#### Application: Real-time avalanche and landslide analysis through sensor networks

Ancey C., Charbon E.

#### Application: Wireless sensor network for pollution monitoring

Robert S.

#### Cluster "Networked Software Systems"

H: Gross T.

#### Checking properties of flexible programs in the presence of modularity

Gross T.

#### VerSePro: Verification of security and privacy protocols for wireless networks

Basin D., Hubaux J.-P.

#### Secure stream ciphers

Meier W.

#### Spam detection based on self-organization

Le Boudec J.-Y.

#### Permasense

Tschudin C.

#### WaterSense

Hubaux J.-P.

#### Cluster "In-Network Information Management"

H: Alonso G.

#### XTream

Alonso G., Kossmann D.,  
Tatbul N.

#### Distributed event detection and localization architecture for wireless sensor networks

Braun T.

#### Data dissemination in mobile ad hoc sensor environments

Murphy A., Pedone F.

#### Sensor awareness

Aberer K., Henzinger M.,  
Süsstrunk S.

#### Serious building games

Gross T., Hovestadt L.,  
Morari M., Thiele L.

#### Idea futures market for MICS technology foresight

Pigneur Y.

#### Distributed software transactional memory for resource-constrained networked devices

Felber P.

### Programmes

#### Doctoral Program in Computer, Communication and Information Sciences

Direction: Henzinger T., Bovay J.

#### Undergrad Research Opportunity Program

Direction: Bovay J.

#### Internship Program for Female Undergraduate Students

Direction: Berseth N.,  
Albertini M.

#### Industrial Liaison Program

Direction: Monti M.

### Heads of Clusters and Participants to the Research Projects

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Alonso Gustavo, Prof.  
Ancey Christophe, Prof.

Basin David, Prof.  
Braun Torsten, Prof.

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EPF Lausanne  
Département Informatik, ETH-Zentrum, Zürich  
Institut für Rechnernetze und Verteilte Systeme,  
Universität Bern

## Third Party Cooperation

(in progress)

### Programmes

- AEOLUS (FP6)
- ARTIST2 (FP6)
- ARTISTDesign
- COMBEST
- CONET (FP7)
- COST 2100
- DEPLOY
- DustBot (FP6)
- Euro FGI (FP6)
- Euro-NF
- FP7CONET
- HAGGLE (FP6)
- Hydrosys - STREP
- MASTER (FP7)
- MEGAFRAME (FP6)
- MINAml (FP6)
- Noe ArtistDesign (FP7)
- OKKAM
- Predator
- SHAPES (FP6)
- STREP
- WASP
- WASP (FP6)

### Research Institutions

(new cooperations since 2007 only)

- Baskin School of Engineering, University of California Santa Cruz, US
- Center of Excellence for Embedded Systems Applied Research (CEESAR), Lucerne University of Applied Sciences and Art (HSLU), CH
- Computational Systems Group, Dept. of Computer Sciences, University of Salzburg, AT
- Computer Science Dept., Jacobs School of Engineering, University of California, San Diego, US
- Database Group, Faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS), University of Twente, Enschede, NL
- Dept. of Computer Science, Ben-Gurion University of the Negev, Beer-Sheba, IL
- Dept. of Computer Science, Brown University, Providence, US
- Dept. of Computer Science, University of California, Los Angeles, US
- Dept. of Electrical and Electronics Engineering, Bilkent University, Ankara, TR
- Dept. of Mathematics and Computer Science, University of Passau, DE
- Digital Enterprise Research Inst. (DERI), Galway, IE
- Ecole d'ingénieurs et d'architectes de Fribourg (EIF), CH
- Eidgenössische Anstalt für Wasserversorgung, Abwasserreinigung und Gewässerschutz (EAWAG) Record project, Dübendorf, CH
- Haute Ecole Pédagogique (HEP) Valais, St Maurice, CH
- Haute Ecole Spécialisée de la Suisse Occidentale (HES SO) Valais, Sion, CH
- Info4Dourou Institut International d'Ingénierie de l'Eau et de l'Environnement, Ouagadougou, BF
- Institut für Angewandte Informationsverarbeitung und Kommunikationstechnologie (IAIK), Technische Universität Graz (TU Graz), AT
- Kavli Inst. for Theoretical Physics, Dept. of Physics, University of California Santa Barbara (UCSB), US

## Topics

Wireless communication is fundamentally changing the way we use information technology: information becomes embedded into our physical environment by means of personal devices and embedded computers, and the physical environment becomes increasingly intertwined with the Internet information space through sensor and actuator technology. In parallel with this qualitative change, the number of devices and the amount of information is growing exponentially. Classical models of design- and controlling central-

ized IT systems will not be able to scale up. Decentralized approaches, based on self-organization principles, need to be studied and developed in order to master the complexity of the resulting systems.

The NCCR MICS is tackling exactly these problems, combining the study of the fundamental principles (network structures, distributed algorithms, information and communication theory) that will underlie these next-generation systems, and an engineering and empirical approach by developing and deploying platforms

(wireless sensor technology, ad-hoc networks, in-network information processing, verification) and testing technologies in applications, as well as looking at economic implications. A particularly interesting class of applications, from a Swiss perspective, will be the environmental monitoring of the behaviour of landslide, permafrost and glaciers. The NCCR MICS strongly believes that this mutual exchange between theoretical work and systems/applications will lead to real progress and to fruitful technology transfer.

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Guerraoui Rachid, Prof.  
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- Snow and Permafrost, Schnee- und Lawinenforschung in Davos (SLF), Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft (WSL), Davos, CH
- Transmission Systems Research Group, University of Pisa, IT
- Verimag Lab., Institut d'Informatique et Mathématiques Appliquées de Grenoble (IMAG), Grenoble, FR

#### Economy / Industry

- Agilent Technologies Deutschland GmbH, Böblingen, DE
- Amadeus Information Technology (IT) Group SA, Sophia-Antipolis, FR
- Amstein + Walthert SA, Lausanne, CH
- Art of Technology AG, Zürich, CH
- British Telecommunications plc (BT), London, GB
- Brugg Kabel AG, Brugg, CH
- Cottet SA, Monthey, CH
- Cyberbotics Sàrl, Ecublens, CH
- Danfoss A/S, Nordborg, DK
- Deutsche Telekom AG, Germany, DE
- DOCOMO Communications Laboratories Europe GmbH, Munich, DE
- egnite GmbH, Castrop-Rauxel, DE
- Forum Nokia (FN) Champion Reward & Recognition Program, Espoo, FI
- Forum Nokia (FN) University PRO Developer Program, Espoo, FI
- Institut für Mobil- und Satelliten-funktechnik (IMST) GmbH, Kamp-Lintfort, DE
- Intel Corporation WCG Group, Portland, US
- Intel Corporation, Portland, US
- Intel Research, Santa Clara, US
- International Business Machines Corporation (IBM) Deutschland Research & Development GmbH, Boeblingen, DE
- International Business Machines Corporation (IBM) Research & Development Laboratories in Israel, Haifa, IL
- International Business Machines Corporation (IBM) Research GmbH, Zurich Research Lab., Rüschlikon, CH
- K-TEAM S.A., Ecublens, CH
- Logitech SA, Romanel sur Morges, CH

#### Achievements

The NCCR MICS investigates a wide range of fundamental problems including routing algorithms for temporarily disconnected wireless networks exploiting node mobility, routing under realistic mobility models, distributed consensus algorithms in wireless networks, the application of tools from statistical mechanics to problems in communications and physics-based signal processing.

#### System platforms, deployment and data management

New system platforms for wireless sensor networks (WSN) remain an important focus of our research. We successfully demonstrated a radio prototype for low-power impulse UWB communication, for a wide range of applications requiring high-density deployments and ranging capabilities. A deployment-support network (DSN)

strictly separating the parts that are dependent and independent of the target architecture has been developed, resulting in a target-independent toolkit that is easy to install and use. The SensorScope system is now routinely deployed with environmental scientists for fine-grained monitoring of environmental phenomena. With SwissQM, we have developed a virtual machine for sensor networks that facilitates the development of applications by migrating data processing tasks into the sensor nodes. For efficiently publishing and processing sensor data, we have built Global Sensor Network (GSN), a middle-ware platform connecting sensor networks to the Internet in a plug-and-play style.

#### Applications

Our fundamental results and system platforms are demonstrated and evalu-

ated in applications for environmental monitoring and engineering. The Swiss Experiment is a new joint initiative with the CCES center of the ETH domain and Microsoft Research. The goal of this initiative is to provide environmental scientists with next-generation e-science platforms, supporting data acquisition based on wireless sensor networks and featuring Web-based tools for data analysis and collaborative research. In Swiss Experiment, MICS technology is being used for monitoring a variety of environmental phenomena like watersheds, snow cover and permafrost.

Other current applications of MICS WSN developments are in fire detection, building energy optimization and odor source location using mobile robots.

Further information see [www.mics.org](http://www.mics.org)

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UC Berkeley, US  
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## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	3 800 000	3 800 000	3 800 000	3 800 000	15 200 000	36
Self-funding from home institution <sup>1</sup>	3 527 120	3 949 763	2 662 360	2 462 226	12 601 469	30
Self-funding from project participants	2 830 164	3 741 902	3 584 312	1 736 490	11 892 868	29
Third-party funding <sup>2</sup>	700 007	420 780	692 477	150 000	1 963 264	5
<b>Total</b>	<b>10 857 291</b>	<b>11 912 445</b>	<b>10 739 149</b>	<b>8 148 716</b>	<b>41 657 601</b>	<b>100</b>

Personnel <sup>3</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	US	FR	AT	IN	
Management	4.67	14	56	11	44	14	1	0	4	1	1	7
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	97	18	19	79	81	29	12	5	4	4	3	40
Postdoctoral students	30	5	17	25	83	5	4	0	3	2	0	16
Research associates	18	3	17	15	83	11	2	1	0	0	0	4
Senior researchers <sup>5</sup>	55	6	11	49	89	21	12	7	1	4	1	11
Other staff	33	3	9	30	91	11	1	2	1	0	6	12
<b>Total</b>	<b>237.67</b>	<b>49</b>	<b>19</b>	<b>209</b>	<b>81</b>	<b>91</b>	<b>32</b>	<b>15</b>	<b>13</b>	<b>11</b>	<b>11</b>	<b>90</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Not included is CTI funding (cf. page 6). Since the start of the NCCR 7 projects have been funded by CTI at a total amount of 8.3 million CHF.

<sup>3</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>4</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>5</sup> Including leaders of the individual projects and other organisational units of the NCCR

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- Siemens AG, München, DE
- Siemens Schweiz AG Building Technologies, Zug, CH
- STMicroelectronics NV, Geneva, CH
- Sun Microsystems Inc., Menlo Park, US
- Swisscom AG, Bern, CH
- Thales Research & Technology Ltd., Weybridge, GB
- Von Roll AGE SA, , CH
- Withestein Technologies AG, Zürich, CH

### Others

- Advanced Process Understanding and prediction of hydrological extremes and Complex Hazards (APUNCH),
- Competence Center Environment and Sustainability (CCES), Zürich, CH
- Aginova Sàrl, Lausanne, CH
- Canton Valais, Martigny, CH
- Digital Games Research Association (DiGRA), Tampere, Finland, FI
- European Space Agency (ESA), Noordwijk, NL
- Extremes project, Competence Center Environment and Sustainability (CCES), Lausanne, CH
- Federal Office of Meteorology and Climatology (MeteoSwiss), Zurich, CH
- FLOWR Foundation, Zürich, CH
- Hasler Foundation, Bern, CH
- International Game Developers Association (IGDA), Frankfurt/Main Chapter, Frankfurt / Main, Germany, DE
- Office Fédéral de la Communication (OFCOM), Bienne, CH
- Serious Games Initiative (serious-games.org), Washington DC, US
- Siemens ; Centre Suisse d'Electronique et de Microtechnique (CSEM), Zürich - Neuchâtel, CH
- STMicroelectronics NV, Plan les Ouates, CH
- Swiss Design Inst. for Finance and Banking, Zurich, CH
- Triggering of Rapid Mass Movements in Steep Terrain project (TRAMM), Competence Center Environment and
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# Financial Valuation and Risk Management

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November 1, 2001

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#### Advancement of Women

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### Public Relations

- Folder «NCCR FINRISK»
- "FINRISK Letter"
- Booklet "Risk and Risky Management"
- Booklet "Challenges to Executive Compensation"
- Booklet "FINRISK – Competence in Finance"

### Research

#### Module "Asset Pricing and Portfolio Management"

Coordinator: Trojani F.

#### Behavioural and evolutionary finance

Head: Hens T.

#### Macro risks, systemic risks and international finance

H: Imbs J.

#### New methods in theoretical and empirical asset pricing

H: Trojani F.

#### Equilibrium asset pricing

H: Dumas B.

#### Module "Corporate Finance"

Coordinator: Degeorge F.

#### Corporate finance, market structure and the theory of the firm

H: Habib M.

#### Dynamic corporate finance and financial innovation

H: Morellec E.

#### Module "Risk Management"

Coordinator: Mancini L.

#### Credit risk and non-standard sources of risk in finance

H: Gibson R.

#### Interest rate and volatility risk

H: Barone-Adesi G.

#### Module "Quantitative Methods in Finance"

Coordinator: Scaillet O.

#### Mathematical methods in financial risk management

H: Schweizer M.

#### Financial econometrics for risk management

H: Scaillet O.

### Programme

#### Swiss Doctoral School in Finance

Supervisor: Morellec, E.  
and Paolella, M.

### Heads of Individual Research Projects, Modules and Supervisors of Doctoral School

Barone-Adesi Giovanni, Prof.

Degeorge François, Prof.

Dumas Bernard, Prof.

Gibson Rajna, Prof.

Habib Michel, Prof.

Hens Thorsten, Prof.

Imbs Jean, Prof.

Mancini Lorian, Prof.

Morellec Erwan, Prof.

Paolella Marc, Prof.

Scaillet Olivier, Prof.

Schweizer Martin, Prof.

Trojani Fabio, Prof.

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della Svizzera Italiana, Lugano

Facoltà di Scienze Economiche, Università  
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Ecole des HEC, Université de Lausanne

Ecole des HEC, Université de Genève

Institut für schweizerisches Bankwesen, Universität Zürich

Institut für schweizerisches Bankwesen, Universität Zürich

Ecole des HEC, Université de Lausanne

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Chair in Corporate Finance, EPF Lausanne

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Departement Mathematik, ETH Zürich

Facoltà di Scienze Economiche, Università della Svizzera Italiana,  
Lugano

### Members of the Advisory Board

Brennan Michael, Prof.

Duffie Darrell, Prof.

Foellmer Hans, Prof.

Gourieroux Christian, Prof.

Pagano Marco, Prof.

Stulz René, Prof.

Uppal Raman, Prof.

University of California, Los Angeles, US

Stanford University, California, US

Humboldt Universität, Berlin, DE

University of Toronto, CA and CREST, Paris, FR

University of Napoli, IT

Ohio State University, Columbus, US

London Business School, GB

## Topics

Assessing risks and modelling their impact on agents' micro- and macro-economic decision-making processes represents the central theme that unites the research topics covered by FINRISK. Thus the main research questions during the second phase (2005-09) relate to the analysis and the modelling of

risks. They are examined in four FINRISK research modules as follows:

- Asset Pricing and Portfolio Management: How do risks affect asset prices and investors' portfolio decisions?
- Corporate Finance: How do risks affect corporations' fundamental decisions?

- Risk Management: How should financial and non-financial risks be quantified and managed?
- Quantitative Methods in Finance: Which are the mathematical and statistical tools that are necessary to provide meaningful answers to the above cited research questions?

## Achievements

In the following we identify four main areas in which substantial achievements have been generated since the start of FINRISK in 2001.

### Research

Within seven years of operation, FINRISK has led to the competitive establishment of 10 research projects in areas of great significance to the financial services industry. Our research output further comprises more than 500 working papers and 300 publications in internationally renowned academic journals. For detailed information on our research achievements please visit our website.

### Knowledge transfer

FINRISK promotes a mutually beneficial dialogue between academics and practitioners interested in the application of modern finance. Through targeted publications as well as the

organization of joint conferences, workshops and collaborative projects FINRISK has strengthened the cooperation between the Swiss universities and the financial services industry. Each year, the annual meeting organized together with the Swiss Finance Institute, attracts more than 200 practitioners and features presentations by both researchers and practitioners on topics of central interest to the finance community.

### Education

A close cooperation between the doctoral programmes in Geneva and Lausanne, Lugano, Sankt Gallen as well as in Zurich has been established over the past years. We now offer a large variety of specialised doctoral courses in finance to more than 100 students from Swiss universities. Furthermore, the annual Swiss Doctoral Workshop in Finance pro-

vides an ideal forum for our students to present their research to a mix of local and international faculty. Ultimately, our efforts have led to the launching of the Swiss Finance Institute PhD program in finance.

### Structural Effects

The activities of FINRISK have contributed to the fact that both the Universities of Zurich and Lausanne have recently declared Finance to be one of their top priority research areas. In 2006, the Swiss Bankers Association, recognising the importance of research and high level education in finance for the reputation of the Financial Centre Switzerland, has launched the Swiss Finance Institute that aims to secure and extend the research and educational efforts of FINRISK in the long-term, see also [www.swissfinanceinstitute.ch](http://www.swissfinanceinstitute.ch).

Further information see [www.nccr-finrisk.ch](http://www.nccr-finrisk.ch)

## Third Party Cooperation

(in progress)

### Research Institutions

(new cooperations since 2003 only)

- Dépt. de sciences économiques, Université de Montréal, CA
- Dept. of Economics and Finance, University of Lugano, CH
- Dept. of Economics, Anderson School of Management, Los Angeles, US
- Dept. of Economics, London School of Economics and Political Science, GB
- Dept. of Economics, University of Basel, CH
- Dept. of Economics, University of Napoli, IT
- Dept. of Economics, University of Virginia, Charlottesville, US
- Dept. of Finance, Boston University, US
- Dept. of Finance, California Inst. of Technology, Caltech, US
- Dept. of Finance, Carnegie Mellon University, Pittsburgh, US
- Dept. of Finance, Columbia University, New York, US
- Dept. of Finance, Concordia University, Montreal, US
- Dept. of Finance, Cornell University, Berkeley, US
- Dept. of Finance, Duke University, Durham, US
- Dept. of Finance, George Mason University, Fairfax, US
- Dept. of Finance, Norwegian School of Economics and Business Administration, Bergen, NO
- Dept. of Finance, University of California, Berkeley, US
- Dept. of Finance, University of Minnesota, US
- Dept. of Finance, University of Rochester, US
- Dept. of Finance, University of Toronto, CA
- Dept. of Finance, Washington University, St Louis, US
- Dept. of Management Sciences, HEC Montréal, CA
- Dept. of Mathematics and Statistics, Boston University, US
- Federal Reserve Bank of New York, US
- Finance Dept., Columbia Business School, New York, US
- Finance Dept., Fuqua School of Business, Duke University, Durham, US
- Finance Dept., School of Business, University of Wisconsin at Madison, US
- Finance Dept., The London Business School, GB
- Finance Dept., The Wharton School, University of Pennsylvania, Philadelphia, US
- Finance Dept., The Wharton School of the University of Pennsylvania, Philadelphia, US
- Graduate School of Business, Stanford University, US
- Graduate School of Business, University of Chicago, US

## Financial Valuation and Risk Management NCCR FINRISK

- Institut für Mathematik, Humboldt Universität zu Berlin, DE
- Inst. of Finance and Accounting, London Business School, GB
- L'école des Hautes Etudes Commerciales (HEC), Université de Genève, CH
- Manchester School of Accounting and Finance, University of Manchester, GB
- Research Dept., European Central Bank, Frankfurt, DE
- Research Dept., International Monetary Fund, Washington, US
- School of Mathematics, University of Leeds, GB

### Economy / Industry

- Associazione Bancaria Ticinese, Lugano, CH
- Banca Del Ceresio, Lugano, CH
- Banca della Svizzera Italiana, Lugano, CH
- Banque de France, Paris, FR
- Banque Nationale de Paris (BNP) Paribas, London, GB
- Caisse de dépôt et placement du Québec (CDPQ), Montreal, CA
- Caisse des Dépôts et Consignations (CDC) Ixis Capital Markets, Paris, FR
- Cédric Bancaire Privée, Geneva, CH
- Cortal Consors S.A., Paris, FR
- Credit Suisse Group, Zurich, CH
- CSS Krankenversicherungen, Luzern, CH
- European Central Bank, Frankfurt am Main, DE
- LGT Capital Management AG, Zürich, CH
- Risk Solution Division - Standard and Poors, Leeds, GB
- Standard and Poors, London, GB
- Zurich Financial Services, Zürich, CH

### Others

- Ausbildungszentrum für Experten der Kapitalanlage (AZEK) / Centre de Formation des Professionnels de
- l'Investissement (CFPI), Bülach, CH
- Banca della Svizzera Italiana (BSI) Gamma Foundation, Lugano, CH
- Edizioni Universitarie della Svizzera Italiana (EUSI), Fondazione della Svizzera italiana per la ricerca scientifica e
- gli studi universitari, Lugano, CH
- Swiss National Bank, Bern, CH

## Statistical Input – Output Data

Funding source (CHF)	Year 5	Year 6	Year 7	Year 8	Total	%
SNSF funding	3 000 000	3 000 000	2 500 000	2 500 000	11 000 000	48
Self-funding from home institution <sup>1</sup>	663 428	604 394	865 000	1 728 614	3 861 436	17
Self-funding from project participants	1 344 000	1 654 052	1 849 500	1 709 590	6 557 142	28
Third-party funding	295 804	437 409	450 500	420 000	1 603 713	7
<b>Total</b>	<b>5 303 232</b>	<b>5 695 855</b>	<b>5 665 000</b>	<b>6 358 204</b>	<b>23 022 291</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	IT	FR	BE	RU	
Management	2.78	5	42	7	58	3	2	1	2	1	0	3
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	72	17	24	55	76	13	12	10	2	1	5	34
Postdoctoral students	16	8	50	8	50	2	5	4	2	0	0	4
Research associates	3	0	0	3	100	0	2	0	0	0	0	1
Senior researchers <sup>4</sup>	57	6	11	51	89	14	7	10	11	6	1	13
Other staff	6	4	67	2	33	5	0	0	0	0	0	1
<b>Total</b>	<b>156.78</b>	<b>40</b>	<b>24</b>	<b>126</b>	<b>76</b>	<b>37</b>	<b>28</b>	<b>25</b>	<b>17</b>	<b>8</b>	<b>6</b>	<b>56</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>3</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>4</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

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# The Power and Meaning of Images

## NCCR Iconic Criticism

### Research

The power of images:  
image politics

Heads: Boehm G., Vischer Th.

Image, architecture  
and word

H: Beyer A.

Time in the image

H: Boehm G., Brandstetter G.

The image of writing

H: Loprieno A.

The literary text as iconic  
criticism

H: Simon R.

The epistemic image –  
Visualization in science,  
technology and humanities

H: Hagner M.,

Renner M., Vetter T.

### Graduate School „Image and Time“

01.01.09 - 31.12.11

Supervisors: Boehm G. /  
Schwarte L.

### Heads of Individual Research Projects

Beyer Andreas, Prof.

Boehm, Gottfried, Prof.

Brandstetter Gabriele, Prof.

Hagner Michael, Prof.

Loprieno Antonio, Prof.

Renner Michael, Prof.

Simon Ralf, Prof.

Vetter Thomas, Prof.

Vischer Theodora, Dr.

Department of the History of Art, University of Basel

Department of the History of Art, University of Basel

Institut für Theaterwissenschaften, Freie Universität Berlin

Chair for Science Studies, ETH Zürich

Institute of Egyptology, University of Basel

Department Visual Communication, University of Art and Design,  
Basel, FHNW

Institute of German Studies, University of Basel

Computer Science Department, University of Basel

Schaulager, Münchenstein/Basel

### Members of the Advisory Board

not yet realised

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### Start of the NCCR

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### Public Relations

• Homepage

### Web Address

www.eikones.ch

## Third Party Cooperation

### Programmes

- Independent Research Group  
"Das wissende Bild"
- Forschergruppe  
"Bild – Schrift – Zahl",  
"Das Technische Bild"
- Graduiertenkolleg  
"Bild Körper Medium. Eine  
anthropologische Perspektive"
- Graduiertenkolleg  
"Mediale Historiographien"
- Graduiertenkolleg  
"Körperinszenierungen"
- DFG-Projekt  
"Visuelle Navigation. Entwicklung  
und Kritik schematischer Karten"
- SFB 447
- SFB 447
- SFB 626
- SFB/FK 427
- SFB/FK 427
- SFB/FK 615

### Research Institutions

- Ägyptologisches Inst.,  
Universität Leipzig, DE
- Center for Art and Media (ZKM),  
Karlsruhe, DE
- Centro Internazionale di Studi  
di Architettura Andrea Palladio,  
Vicenza, IT
- Datenströme GbR, Berlin, DE
- Dept. of Adult and  
Continuing Education,  
University of Glasgow, GB
- Dept. of Egyptology,  
Hebrew University, Jerusalem, IL
- Dept. of German, Northwestern  
University, Chicago, US
- Dipart. di Discipline storiche,  
artistiche, archeologiche e geogra-  
fiche, Università di Verona, IT
- Ecole des Hautes Etudes en Sci-  
ences Sociales (EHESS), Paris, FR
- Fachgebiet Formale Modelle,  
Logik und Programmierung (FLP),  
Technische Universität, Berlin, DE
- Facultad de Arquitectura,  
Diseño y Urbanismo,  
Universidad de Buenos Aires, AR
- Fakultät Bildende Kunst,  
Hochschule der Künste Berlin, DE
- Fakultät Medien,  
Bauhaus-Universität Weimar, DE
- Hermann von Helmholtz-Zentrum  
für Kulturtechnik, Berlin, DE
- Historisches Seminar,  
Universität Luzern, CH
- Hochschule für Gestaltung (HGK),  
Fachhochschule Nordwestschweiz  
(FHNW), Basel, CH
- Inst. für Ägyptologie, Universität  
München, DE
- Inst. für deutsche Literatur,  
Humboldt-Universität Berlin, DE
- Inst. für deutsche Sprache und  
Literatur, Humboldt-Universität  
Berlin, DE
- Inst. für Film- und  
Theaterwissenschaften,  
Freie Universität Berlin, DE
- Inst. für Geschichte und  
Theorie der Architektur (gta),  
ETH Zürich, CH
- Inst. für Informatik,  
Humboldt-Universität Berlin, DE
- Inst. für Mathematik,  
Humboldt-Universität Berlin, DE
- Inst. für Medizinische Radiologie,  
Universität Basel, CH
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Literatur, Justus-Liebig-Univer-  
sität, Giessen, DE
- Inst. für Philosophie, Technische  
Universität Darmstadt, DE

## The Power and Meaning of Images NCCR Iconic Criticism

### Topics

The digital revolution, which has been unfolding globally since the beginning of the nineties, turns the old, inert image into an extremely flexible instrument that everyone can use, serving global communication and, above all, the generation of knowledge. Especially in the natural sciences, many new insights can only be realized with iconic methods. Images no longer illustrate what was first thought; they now represent an independent mode of thinking. The knowledge society has become a society of images. This transformation can probably only be compared with such epochal mo-

ments as the invention of the printing press or the general spread of literacy since the eighteenth century. Now we are all users and producers of images – but without necessarily understanding how they create meaning, how their power is generated, and what becomes of reality when it is understood as a function of the flexible perspective of the image. That is the starting point for our project: the image-oriented society is increasingly dependent on iconic criticism if it wants to master its problems. The paradigm of the image, which had not previously existed, deserves the scholarly attention language has

received for centuries. Linguistics is a matter of course; iconic criticism must be one, too. The two complement each other – but only if the particular capacity of the image can be determined. This demands a fundamental reorientation, for we are used to identifying knowledge with language. The meaning potentials of the image create new openings to the present, to history and tradition, and into the future. An iconic criticism that addresses epistemic principles and exemplary applications is – as mentioned above – the task of a generation.

### Achievements

After completing its setup phase and fully consolidating its work in the whole range of its modules, the NCCR Iconic Criticism has now established itself as a visible, recognized research competence center, the heart of a network with regional, national, and international connections. In only a few years, the project has succeeded in assuming a position as one of the leading institutions in image research. The great frequency of its scholarly events and publications, including a Summer School, cooperation with

institutions all over the world, intensive collaboration between senior scholars and younger researchers, and last but not least a Graduate School, have made it possible to create a first-class interdisciplinary academic institution. The projects suggested in the first proposal have proven successful and are now being extended, supplemented, and developed further. The overall project's trademark is an exciting balance between empiricism and theory, between individual research and a general critical inter-

est in images. The NCCR has a group of all its members that meets regularly and is dedicated to the common interest in basic issues of the image and the task of "iconic criticism". The project defines itself in terms of the overall coherence of its results, connecting basic research with case studies and theories with applications. In terms of both organization and content, the NCCR has steadily adapted to new challenges and changing situations.

Further information see [www.eikones.ch](http://www.eikones.ch)

- Inst. für Philosophie, Universität Wien, AT
  - Inst. für Sprach- und Kommunikationswissenschaft, Rheinisch-Westfälische Technische Hochschule (RWTH), Aachen, DE
  - Inst. für Theorie der Gestaltung und Kunst, Hochschule für Gestaltung und Kunst Zürich (HGKZ), CH
  - Inst. für Vorderasiatische Archäologie, Freie Universität Berlin, DE
  - Inst. of Archaeology and Antiquity, University of Birmingham, GB
  - Internationales Forschungszentrum Kulturwissenschaften (IFK), Wien, AT
  - Kulturwissenschaftliches Seminar, Humboldt-Universität Berlin, DE
  - Kunstgeschichtliches Inst., Universität Bochum, DE
  - Kunsthistorisches Inst. Florenz, Max-Planck-Inst., Florenz, IT
  - Kunsthistorisches Inst., Universität Köln, DE
  - Kunsthistorisches Seminar, Humboldt-Universität, Berlin, DE
  - Kunsthistorisches Seminar, Ruhr-Universität Bochum, Ornament-Netzwerk, DE
  - Kunsthistorisches Seminar, Universität Basel, CH
  - Kunsthistorisches Seminar, Universität Bern, CH
  - Kunsthistorisches Seminar, Universität Hamburg, DE
  - Kunsthistorisches Seminar, Universität Zürich, CH
  - Leerstoelgroep Theaterwetenschap, Faculteit der Geesteswetenschappen, Universiteit van Amsterdam, NL
  - Max-Planck-Inst. für Hirnforschung, Frankfurt a. M., DE
  - Museo Gregoriano Egizio, Vatican Museum, Vatican City State (Holy See), VA
  - Professur für Philosophie, ETH Zürich, CH
  - Professur für Technikgeschichte, ETH Zürich, CH
  - Research Network "History of Scientific Objects", Max-Planck-Inst. für Wissenschaftsgeschichte, Berlin, DE
  - Seminar für Archäologie und Kulturgeschichte Nordostafrikas, Humboldt-Universität Berlin, DE
  - Seminar für Ästhetik, Humboldt-Universität Berlin, DE
  - Swiss Inst. e of Banking and Finance, Universität St. Gallen, CH
  - Tandemprojekt "Ikonotext. Historische Wahrnehmungsformen in Text und Bild", Universität Leipzig, DE
  - Theologisches Inst., Universität Basel, CH
  - Vakgroep Duits, Universiteit Gent, BE
  - Zentrum für Bewegungsforschung, Inst. für Theaterwissenschaft, Freie Universität Berlin, DE
  - Zentrum zur Erforschung der Frühen Neuzeit, Johann Wolfgang-Goethe-Universität Frankfurt a. M., DE
- Others**
- IG Tanz - Tanzbüro Basel, Basel, CH
  - Mediathek tanz.ch, Zürich, CH
  - Stiftung Bibliothek Werner Oechslin, Einsiedeln, CH

## Statistical Input – Output Data

Funding source (CHF)	Year 1	Year 2	Year 3	Year 4	Total	%
SNSF funding	1 775 000	1 775 000	1 775 000	1 775 000	7 100 000	40
Self-funding from home institution <sup>1</sup>	641 699	1 023 214	1 153 147	2 506 941	5 325 001	30
Self-funding from project participants	1 030 368	1 138 448	708 290	1 643 337	4 520 443	26
Third-party funding	190 859	347 616	178 388	0	716 863	4
<b>Total</b>	<b>3 637 926</b>	<b>4 284 278</b>	<b>3 814 825</b>	<b>5 925 278</b>	<b>17 662 307</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	IT	AT	US	AR	
Management	4.35	4	50	4	50	4	3	1	0	0	1	1
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	30	19	63	11	37	9	16	4	2	0	0	2
Postdoctoral students	12	3	25	9	75	2	9	2	0	0	0	1
Research associates	0	0	0	0	0	0	0	0	0	0	0	0
Senior researchers <sup>4</sup>	13	2	15	11	85	3	9	1	0	2	0	0
Other staff	6	3	50	3	50	6	1	0	0	0	0	0
<b>Total</b>	<b>65.35</b>	<b>31</b>	<b>45</b>	<b>38</b>	<b>55</b>	<b>24</b>	<b>38</b>	<b>8</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>4</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>3</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>4</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

### Members of the Review Panel

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Krämer Sybille, Prof.

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Swiss National Science Foundation, Berne, CH

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Max-Planck-Institut für Wissenschaftsgeschichte, Berlin, DE

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# International Trade Regulation: From Fragmentation to Coherence

## NCCR Trade Regulation

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### Start of the NCCR

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### NCCR Management

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#### Education and Training

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### Research

#### Research Cluster A Constitutional Topics

Coordinator:  
Kaufmann C.  
Alternate: Ziegler A.

#### Constitutionalism and multilayered governance

Head: Peters A., Armingeon K.  
Alternate Leader: Elsig M.

#### Decision-making in the WTO and in other international organizations

H: Dupont C., Ziegler A.  
AL: Elsig M.

#### Special and differential treatment, variable geometry and regionalism

H: Baldwin R.  
AL: Carpenter T.

#### The role of human rights in trade regulation

H: Kaufmann C.  
AL: Gehne K.

#### Research Cluster B Unresolved Regulatory Issues

Coordinator: Baldwin R.  
Alternate: Graber C.

#### Regulation sustainable agriculture in WTO law and policy

H: Lehman B.  
AL: Aerni P.

#### Energy in WTO law and policy

H: Cottier T.  
AL: Nartova O.

#### The WTO and the legal protection of cultural diversity in a digital networked environment

H: Graber C.  
AL: Burri M.

#### Developing trade rules for services: Prudential standards, trade remedies, competition and migration

H: Sauvé P.  
AL: Panizzon M.

#### Genetic engineering in international trade regulation and policy:

#### Intellectual property, technical regulation and the impact of human rights

H: Cottier T.  
AL: Biber-Klemm S.

#### Research Cluster C Establishing Regulatory Linkages in International Trade, Investment and Finance

Coordinator: Baltensperger E.  
Alternate: Gugler P.

#### International trade and finance

H: Baltensperger E.  
AL: Herger N.

#### Multilateral rules on trade and investment

H: Gugler P.  
AL: Chaisse J.

#### Trade in primary commodities: Financial sustainability and market structures

H: Nissanke M.  
AL: Ferrarini B.

#### Platforms, Programmes etc.

Annual NCCR conference

Biannual IP workshops  
and symposia

## Third Party Cooperation (international cooperations only)

### Programmes

- Global Trading System IADB-WTO Joint Research Programme
- Geneva Trade and Development Forum

### Research Institutions

(foreign only)

- (Iranian) Centre for Globalization Studies, Teheran, IR
- Abteilung internationales Wirtschaftsrecht, Max-Planck-Institut für ausländisches öffentliches Recht und Völkerrecht der Georg-August Universität Göttingen, Heidelberg, DE
- African Economic Research Consortium, Nairobi, KE
- Agricultural research for developing countries (CIRAD), Montpellier, FR
- Berkman Center for Internet and Society, Cambridge, US
- Birkbeck College, Faculty of Law, University of London, GB
- Business School, Dept. of Economics, University Reading, GB
- Collaborative Research Center 597 "Transformations of the State", Centre for Social Policy Research and Inst. For
- Intercultural and International Studies, University of Bremen, DE
- Danish Inst. for International Studies (DIIS), Copenhagen, DK
- Dept. of Economics and Sussex European Inst., University of Sussex, GB
- Dept. of Economics, Bosphorus University, Istanbul, TR
- Dept. of Economics, Open University, Milton Keynes, GB
- Dept. of Economics, University of Melbourne, AU
- Dept. of International and Applied Economics, Massey University, Palmerston North, NZ
- Dept. of Management, Glasgow University, GB
- Dept. of Monetary Theory and Policy, University of Economics, Prague, CZ
- Dept. of Political Economy, University of Genoa, IT
- European Center for Advanced Research in Economics and Statistics (ECARES), Université Libre de Bruxelles, BE
- European Center for Advanced Research in Economics and Statistics (ECARES), University of Warwick, GB
- European center for international political economy (ECIPE), Bruxelles, BE
- Executive Director of the Brooks World Poverty Inst., University of Manchester, GB
- Faculty of Law, University of Maastricht, NL
- Faculty of Law, University of Wollongong, AU
- Global Development Network, Delhi, IN
- Indian Council for Research on International Economic Relations, New Delhi, IN
- Indian Inst. of Foreign Trade, New Delhi, IN
- Inst. of Agricultural Economics and Development, Chinese Academy of Agricultural Sciences, Beijing, CN
- Inst. of Development Studies, University of Sussex, Brighton, GB

## Topics

WTO rules increasingly impinge upon areas of law and policy including environmental protection, agricultural and regional policies, labour standards, human rights and culture. The purpose of NCCR Trade Regulation is to develop innovative, concrete policy recommendations

that reflect a better balance between economic and other regulatory objectives, taking into consideration insights from the disciplines of law, economics and political science. Sustainability will be a key criterion for all proposals. The project is premised on the idea that academia is

going to have an increasingly important role to play in conceptualizing the regulatory debates of the future, and, in particular, elucidating the value-related choices enjeux. Such thinking has to take place outside of the political arena as it cannot be based on short-term rationales.

## Heads of Individual Research Projects and Subprojects

Aerni Philipp, Dr.	c/o World Trade Institute, Bern
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Hergler Nils, Dr.	Volkswirtschaftliches Institut, Universität Bern
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Lehmann Bernard, Prof.	Institut für Agrarwissenschaft, ETH Zürich
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Panizzon Marion, Dr.	c/o World Trade Institute, Bern
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Ziegler Andreas, Prof.	Droit International Public Centre, Université de Lausanne

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- Inst. of statistical social and economic research (ISSER), University of Ghana, Accra, GH
- Intellectual Property Innovation, Technology and Law, University of Edinburgh, GB
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- North-South Inst., Ottawa, CA
- Queen Mary Intellectual Property Research Inst., University of London, GB
- Research Centre in Industrial Organisation, University Paris XIII, Faculty of economics, Paris, FR
- Research Inst. on Contemporary southeast Asia (IRASEC), Bangkok, TH
- School of Management and Business, University of Wales, Aberystwyth, GB
- School of Social and Politics Studies (SSPS) Dept., University of Edinburgh, GB
- Tanzania Coffee Research Inst. (TACRI), Moshi, TZ
- Ukiriguru - Agricultural Research and Training Inst., Mwanza, TZ
- Unicamp, State University of Campinas, BR
- Utrecht School of Arts, Utrecht, NL
- World Inst. for Development Economics Research (Wider), United Nations University (UNU), Helsinki, FI

#### Economy / Industry

- Asian Development Bank, Investment and enterprises section, Manila, PH
- Bank of America, London, GB
- Bank of Zambia, Lusaka, ZM
- Bloomsbury Metals Economics, Ltd, London, GB
- Central Bank of Brasil, Rio de Janeiro, BR
- European Broadcasting Union, Geneva, CH
- International Network for Cultural Diversity (INCD), Ottawa, CA
- Malaysian Biotechnology Corporation, Kuala Lumpur, MY
- Organisation for Economic Cooperation and Development (OECD), division investment and agriculture, Paris, FR
- Organisation for Economic Cooperation and Development (OECD), Finance and investment division, Paris, FR
- SRG idée suisse, Zurich, CH
- Swiss Authors' Rights Society for Audiovisual Works (Suissimage), Zurich, CH
- Swiss National Bank (SNB), Zurich, CH
- Swiss Society for the Rights of Authors of Musical Works (SUISA), Zurich, CH
- United Nations (UN), Economic and Social Commission for Asia and the Pacific, Investment and Enterprises section, Thailand, TH
- Zurich Financial Services, Government and Industry Affairs, Zurich, CH

## International Trade Regulation: From Fragmentation to Coherence NCCR Trade Regulation

### Achievements

Until fairly recently, international trade regulation has been undertaken as a specialised field of international law and economic policy, insufficiently inter-linked with other areas of law and policy that WTO rules increasingly affect, as well as the institutions that generate these norms. We are involved in establishing a unique multidisciplinary research network that seeks to bring greater coherence to the study of these fragmented interfaces.

### Research accomplishments

Research during our first phase essentially followed the projects and plans set out in the research agenda adopted at the outset of our project. Published output has been considerable; it is expected to grow further in the remaining months until September 2009. Research efforts in all IPs were dedicated to improve coherence within trade regulation and in relation to other policy areas. Main efforts and accomplishments include: Contributions to the development of a theory of multilayered governance, addressing “compensatory constitutionalism” as well as the allocation of powers between international institutions; Conceptual insights concerning the WTO Secretariat's role as a “political agent”, or actor in the trade policy making and enforcement processes; The “multilateralisation of regionalism”; conceptualization of a tool for human rights impact assessments of trade-related rules and policies; Innovative, inter-disciplinary policy recommendations concerning regulatory changes required in the WTO's Agriculture Agreement to promote (a) sustainable agriculture (b) food security, and 3) innovation and entrepreneurship; Path-breaking work relating to the identification of problems concerning climate

change and trade regulation; Contributions to the development of regulatory models for coherent media regulation on a global level reflecting the effects of new digital technologies upon cultural diversity; Leadership in the development of a comprehensive and coherent new policy concept on “migration partnerships”, a mechanism that emphasises shared responsibility between host and source countries of migrants, and is likely to lead to a paradigm shift in the management of migration policy; Contributions to shape an appropriate international framework for biotechnology regulation and distinguishing the process of risk assessment from risk management; Inter-disciplinary insights relating to the impact of the Euro on trade, and; Proposals for financial mechanisms to deal with commodity price fluctuations. Efforts have started to produce a comprehensive report, integrating our key results along with insights for coherence from our research in a volume to be produced by the end of phase 1.

### Knowledge transfer and communications

Our research has now progressed to the point where we are actively seeking to establish better lines of communication between our researchers and the NCCR's various stakeholders, especially, but not exclusively, the public. A key priority for the remainder of the first phase of our funding will be with the so-called “vulgarisation” of our results, along with development of a more structured approach to our management of our knowledge transfer and communications functions.

**Restructuring of the World Trade Institute and the NCCR**  
Within the framework of the NCCR, the University of

Bern has committed itself to complete and sustainable integration of the World Trade Institute Foundation into the structures of the University of Bern. The WTI will be an interdisciplinary institute of the University of Bern with a national and international outreach in teaching and research, similar to the Oeschger Institut, founded within the framework of NCCR Climate in 2007.

### Education and training

The NCCR is currently providing funding for 21 doctoral students, based both in Bern and across its network; it has received outstanding reviews for its work in training the “next generation” from members of its Review Panel. Anticipating the integration of the NCCR and the WTI into UNIBE structures, the NCCR has continued to strengthen its institutional linkages with the educational programmes of the WTI. Several of the NCCR's Alternate Leaders now serve as teachers on the latter's inter-disciplinary Masters faculty, in the summer academy and in the relevant UNIBE faculties. Thanks, in particular, to the University's commitment to funding three assistant professorships - we are planning to introduce doctoral programs in Trade Economics and International Political Economy (IR), working in conjunction with the relevant UNIBE faculties. This will complement the existing PhD program in International Economic Law offered by the Institut für Europa-und Wirtschaftsvölkerrecht, enabling the WTI to become a proper interdisciplinary graduate school specialised in international trade regulation. We expect to be in a position to do this early in the first two years of the second phase.

Further information see [www.nccr-trade.ch](http://www.nccr-trade.ch)

## Statistical Input – Output Data

Funding source (CHF)	Year 1	Year 2	Year 3	Year 4	Total	%
SNSF funding	2 600 000	2 600 000	2 600 000	2 600 000	10 400 000	73
Self-funding from home institution <sup>1</sup>	267 074	265 617	270 000	277 309	1 080 000	8
Self-funding from project participants <sup>2</sup>	444 000	444 000	444 000	444 000	1 776 000	12
Third-party funding	252 557	111 641	163 066	472 736	1 000 000	7
<b>Total</b>	<b>3 563 631</b>	<b>3 421 258</b>	<b>3 477 066</b>	<b>3 794 045</b>	<b>14 256 000</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	US	GB	IT	CA	
Management	4.43	10	59	7	41	13	1	4	1	0	1	2
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	23	12	52	11	48	8	2	0	2	3	1	11
Postdoctoral students	4	2	50	2	50	1	1	0	1	0	0	2
Research associates	4	2	50	2	50	0	0	1	0	1	0	3
Senior researchers <sup>4</sup>	28	8	29	20	71	20	1	2	1	0	1	5
Other staff	7	3	43	4	57	1	3	0	1	0	0	2
<b>Total</b>	<b>70.43</b>	<b>37</b>	<b>45</b>	<b>46</b>	<b>55</b>	<b>43</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>25</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>3</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>4</sup> Including leaders of the individual projects and other organisational units of the NCCR

## Evaluation and Monitoring by the Swiss National Science Foundation (SNSF)

### Members of the Review Panel

Foray Dominique, Prof. (Chair)

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McGrew Anthony, Prof.

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Opitz Belakhal Claudia, Prof.

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School of Social Sciences, University of Southampton, GB

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Faculty of Law, University of Ottawa, CA

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### Others

- Advisory Centre on WTO Law, Geneva, CH
- Budin&Partner, Genf, CH
- Center for Corporate Responsibility and Sustainability, Zurich, CH
- Center on Migration Policy and Society, Oxford, GB
- Central bank of the Czech Republic, Prague, CZ
- Commonwealth Secretariat, London, GB
- Division on Investment, Technology and Enterprise, Development (UNCTAD), Geneva, CH
- European Central Bank, Frankfurt, DE
- European Commission Delegation in Zambia, Lusaka, ZM
- European Commission, Directorate for Trade, Division of Trade and Investment, Brussels, BE
- Food and Agriculture Organisation, Animal Production and Health Division, Rome, IT
- F rderverein Menschenrechtsinstitution, Bern, CH
- Friedrich-Ebert-Stiftung (FES), Genf, CH
- Global Economic Governance Centre, University of Oxford, GB
- International Centre For Trade And Sustainable Development (ICTSD) - Programme on Services (ICTSD), Geneva, CH
- International Coffee Organisation, London, GB
- International Law Association, Committee on Biotechnology and International Law, London, GB
- International Organization for Migration (IOM), Geneva, CH
- Investment Issues Analysis Branch at UNCTAD, Geneva, Geneva, CH
- Norwegian Centre for Human Rights, Oslo, NO
- Organisation for Economic Cooperation and Development (OECD), Paris, FR
- Society of International Economic Law, London, GB
- Society of International Economic Law, Washington, US
- South Center, Intergovernmental Organization of Developing Countries, Geneva, CH
- South Centre, Innovation, an Access to Knowledge Programme, Geneva, CH
- Staatssekretariat f r Wirtschaft SECO, Investment unit, Bern, CH
- Swiss Delegation to OECD in Paris, Paris, FR
- Swiss Federal Inst. of Intellectual Property, Berne, CH
- Swiss Federal Office of Communications, Biel, CH
- Swiss Federal Office of Culture, Berne, CH
- Swiss Foreign Ministry (EDA), International Law Directorate (DV), Berne, CH
- UK Dept. of Trade and Industry, London, GB
- United Nation Educational, Scientific and Cultural Organization, Paris, CH
- United Nations Conference on Trade and Development (UNCTAD), Geneva, CH
- WilmerHale, Washington, US
- World Bank, Washington, US
- World Trade Organisation (WTO), Geneva, CH
- World Trade Organisation, Trade in Services Division, Geneva, CH

# Mediality – Historical Perspectives

## NCCR Mediality

### Home Institution

University of Zurich

### Start of the NCCR

October 1, 2005

### NCCR Management

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### Research

#### Institutionalization

Techniques and methods  
of medieval continental  
Germanic literacy

Head: Glaser E., Rübekel L.

From spoken to written word:  
The scripting of the Germanic  
languages from a comparative  
perspective

H: Fischer A.

The transition from papyrus  
to paper as reflected in Arabic  
papyri and papers

H: Kaplony A.

Communication with images  
of glass, light, and color:  
The media character and  
significance of glass painting  
in Switzerland until the end  
of the Middle Ages

H: Kurmann-Schwarz B.

#### Interference

The staging of writing:  
Translation, vocality, and  
intentionality of writing  
in Scandinavian literature  
of the middle ages

H: Glauser J.

Texts and images – Education  
and conversation. Media  
circumstances and functional  
interferences

H: Lutz E. C.

Orality – visuality – writing /  
oralité – visibilité – écriture

H: Wetzel R.

### Display

Complex medialities of  
the late middle ages:  
The example of vernacular  
religious plays

H: Kiening C.

Mediality of the pilgrimage:  
“Advertising” between magic  
imagining and calculated  
cult propaganda

H: Rendtel C.,  
Wittmer-Butsch M.

Media display of relics  
in medieval Rome

H: Claussen P.C.

Violence and morality:  
Discourses, images, and  
media flux around 1500

H: Burghartz S.

### Instrumentalization

The image of ruling power  
and its relationship to law in  
the transition from the middle  
ages to the early modern  
period

H: Thier A.

Media of order: Practices for  
handling legal records and  
changes in political culture  
(1200–1500)

H: Teuscher S.

Cartography of power

H: Stercken M.

Documentary sources and  
language elaboration in  
the late French middle ages

H: Gleßgen M.

Functions of Latin versification  
in the middle ages

H: Stotz P.

### Transference

“Transference” as a basic  
concept of mediality  
(literature and visual culture)

H: Naumann B.

“Crossmapping” – Transfer-  
ence in philosophy, literature,  
and visual culture

H: Bronfen E.

Rhetoric of transference  
in the late 18<sup>th</sup> and early  
19<sup>th</sup> centuries

H: Müller Nielaba D.

Transference of knowledge:  
Media-related and disciplinary  
constellations in Stifter and  
Musil

H: Wagner K.

A history of the representation  
of flesh in Western art

H: Stoichita V.

### Heads of Individual Research Projects

Bronfen Elisabeth, Prof.  
Burghartz Susanna, Prof.  
Claussen Cornelius, Prof.  
Fischer Andreas, Prof.  
Glaser Elvira, Prof.  
Glauser Jürg, Prof.  
Glessgen Martin-Dietrich, Prof.  
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Deutsches Seminar, Universität Zürich  
Romanisches Seminar, Universität Zürich  
Orientalisches Seminar, Universität Zürich  
Deutsches Seminar, Universität Zürich  
Kunsthistorisches Seminar, Universität Zürich

## Achievements

The NCCR stimulates research on premodern medial phenomena. Its added value is to concentrate and amalgamate theories, approaches, and observations made in different scientific fields and create a new understanding of mediality before the period of mass media and media theories. Thus it has social relevance and can change traditional knowledge.

### Not media but mediality

Unlike most contemporary media studies the NCCR does not focus on single media but on complex media situations. It asks the question of what can be

used as a medium, how in specific situations and constellations meaning can be generated, how the usage of mediality was institutionalized, and in which ways it has been reflected by contemporaries.

### Theories and models of mediality

Bringing together researchers from different fields and scientific traditions the NCCR studies historical theories and models of mediality plumbing antique, medieval, and early modern reflection on language, texts, and images of different kind. It also examines

the artefacts themselves and how they reveal knowledge of the ways and means of communication.

### Conditions of the possibilities of mediality

Setting the focus on the analysis of historical issues of huge variety the NCCR's single projects considerate the basic conditions that enable communication. Looking into premodern forms of mediality, they widen the modern discussion on media bringing in epistemological and ontological aspects.

Further information see [www.mediality.ch](http://www.mediality.ch)

## Third Party Cooperation

### Research Institutions

- Ältere deutsche Germanistik, Universität Trier, DE
- Anglistische Literatur- und Kulturwissenschaft, Universität Bern, CH
- Centre for Medieval Studies (CMS), University of Bergen, NO
- Centre for Medieval Studies, University of Oslo, NO
- Dept. of Comparative Literature, Stanford University, US
- Dept. of German, University of Berkeley, US
- Dept. of Germanic Studies, University of Chicago, US
- Dept. of History, University of Maynooth, IE
- Deutsches Seminar, Albert-Ludwigs-Universität, Freiburg i. Br., DE
- Deutsches Seminar, Eberhard-Karls-Universität, Tübingen, DE
- Ecole Nationale des Chartes, Paris, FR
- Fachbereich 05: Gesellschaftswissenschaften, Universität Kassel, DE
- Fachbereich Germanistik und Kunstwissenschaften, Philipps-Universität Marburg, DE
- Fachbereich Literaturwissenschaft, Universität Konstanz, DE
- Fakultät der Geisteswissenschaften, Universität Amsterdam, NL
- German Medieval and Linguistic Studies, University of Oxford, GB
- Historisches Institut, Universität Stuttgart, DE
- Historisches Seminar, Abt. für Westfälische Landesgeschichte, Universität Münster, DE
- Historisches Seminar, Universität Lausanne, CH
- Historisches Seminar, Universität Strasbourg, FR
- Hochschule für Gestaltung und Kunst Zürich, CH
- Inst. für Allgemeine und Vergleichende Literaturwissenschaft, Universität Frankfurt a. M., DE
- Inst. für Bildende Kunst und Kulturwissenschaften, Kunstuniversität Linz, AT
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- Inst. für Deutsche und Niederländische Philologie, Freie Universität Berlin, DE
- Inst. für Germanistik, Germanistische Mediävistik, Universität Erlangen-Nürnberg, DE
- Inst. für Kunstgeschichte, Radboud-Universität Nijmegen, NL

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Ruhe Doris, Prof. em. Würzburg (emeritus Universität Greifswald), DE  
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- Istituto Svizzero di Roma, IT
- Lab. de Français Ancien, Université d'Ottawa, CA
- Lehrstuhl für Deutsche Sprachwissenschaft, Katholische Universität Eichstätt-Ingolstadt, DE
- Lehrstuhl für Deutsche Sprachwissenschaft, Universität Bamberg, DE
- Maison Méditerranéenne des Sciences de l'Homme, Aix-en-Provence, FR
- Mediävistisches Institut, Universität München, DE
- Medieval English Studies, Harvard University, US
- Medieval Studies, University of Oslo, NO
- Medieval Studies, University of Reykjavik, IS
- Musikwissenschaft, Universität Hamburg, DE
- Newsham College, University of Cambridge, GB
- Philosophisches Seminar, Universität Basel, CH
- Romanische Philologie, Freie Universität Bozen, IT
- Royal Irish Academy, University of Dublin, IE
- Schweizerische Akademische Gesellschaft für Germanistik (SAGG), Genf, CH
- Section d'histoire de l'art, Université de Lausanne, CH
- Sorbonne, Université Paris, FR
- Università degli Studi della Tuscia, Viterbo, IT
- University of California at Berkeley (several departments), US
- Vitrocentre Romont, Centre Suisse de Recherche et d'information sur le Vitrail, Romont, CH
- Zentrum für Datenverarbeitung, Eberhard Karls Universität Tübingen, DE

### Topics

Media both enable and influence communication. This can be clearly seen from modern communication technologies which have brought about a fundamental change in our societies. However, the phenomenon can also be observed in earlier eras which possess their own form of mediality. The National Centre of Competence in Research (NCCR) “Mediality. Historical perspectives” looks into the link between the forming of cultural meaning and media forms and how this has changed over the passage of time.

Its 20 individual projects are purposely not devoted primarily to the present day, its mass media and diverse media theories. The study instead looks mainly at the Middle Ages and the Early Modern Period, in other words the very era

which saw the emergence of the conditions leading to modern mediality.

In the Middle Ages and Early Modern Period writing was by no means a customary skill but was surrounded by an aura. There were no mass media at that time. Communication was a face to face interchange. However, wide-ranging changes also took place in these times. Communication networks developed, the use of paper increased, new types and combinations of texts and images emerged and the printing press broadened communication.

This development can be best observed where there is an interface between or transformation of media forms, where they become the subject of discussion and reflection. The aim of the NCCR “Mediality. Historical perspectives” is

to plumb the historical dimensions of mediality, to provide an insight into the various forms, phenomena and processes, categories, models and metaphors in which communication appears. The objective is also to combine historical and systematic perspectives and to present the situation today in a more focused light.

Leading house is the Competence Centre for Medieval Studies at Zurich University. The Universities of Basel, Freiburg and Geneva are also participating in the project which encompasses historical and linguistic sciences, cultural and art sciences. It provides a broad network for experts on the Middle Ages as well as for media historians and offers a framework for concentrated and innovative training for young scientists.

### Statistical Input – Output Data

Funding source (CHF)	Year 1	Year 2	Year 3	Year 4	Total	%
SNSF funding	1 425 000	1 425 000	1 425 000	1 425 000	5 700 000	66
Self-funding from home institution <sup>1</sup>	326 994	610 240	805 217	567 500	2 309 951	27
Self-funding from project participants <sup>2</sup>	124 450	69 751	67 501	67 501	329 203	4
Third-party funding	25 128	7 542	112 731	118 448	263 849	3
<b>Total</b>	<b>1 901 572</b>	<b>2 112 533</b>	<b>2 410 449</b>	<b>2 178 449</b>	<b>8 603 003</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	AT	IT	GB	LU	
Management	3.65	4	50	4	50	3	5	0	1	0	0	0
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	25	17	68	8	32	14	7	1	1	0	1	1
Postdoctoral students	9	5	56	4	44	4	4	0	0	1	0	1
Research associates	0	0	0	0	0	0	0	0	0	0	0	0
Senior researchers <sup>4</sup>	6	2	33	4	67	15	14	1	0	0	0	1
Other staff	5	4	80	1	20	5	0	0	0	0	0	0
<b>Total</b>	<b>48.65</b>	<b>32</b>	<b>60</b>	<b>21</b>	<b>40</b>	<b>41</b>	<b>30</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>3</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>3</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>4</sup> Including leaders of the individual projects and other organisational units of the NCCR

# Challenges to Democracy in the 21<sup>st</sup> Century

## NCCR Democracy

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October 1, 2005

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### Public Relations

- Newsletter (print)
- Public events
- Website
- Press releases
- E-Newsletter

### Research

#### Module “Expanding Democratic Governance in the International Realm”

Leader: Cederman L.-E.

Democratizing global institutions: the WTO as an emerging polity

Head: Dupont C.

Promoting democracy in the EU and its near abroad

H: Lavenex S., Schimmelfennig F.

Democratizing divided societies in bad neighborhoods

H: Cederman L.-E.

From national to supra-national democracy in the European Union

H: Caramani D.

Legitimacy and democracy in multilateral integration

H: Cheneval F.

#### Module “Changing Relations between Input, Throughput, and Output in Public Governance”

Leader: Papadopoulos I.,

The impact of internationalization on Swiss policy processes in comparative perspective

H: Papadopoulos I.

Assessing the trend towards new regionalism in Swiss metropolitan areas

H: Kübler D.

### Heads of Individual Research Projects

Bernauer Thomas, Prof.

Bonfadelli Heinz, Prof.

Bühlmann Marc, Dr.  
Caramani Daniele, Prof.  
Cederman Lars-Erik, Prof.

Cheneval Francis Prof.  
Donges Patrick, Prof.

Information on public performance – Creation, diffusion and utilization

H: Widmer T., Bonfadelli H.

Democratic structures and processes and the provision of public goods

H: Bernauer T., Koubi V.

#### Module “Changing Structures and Actors of Political Communication”

Leader: Donges P.

Democracy in the media society – Theoretical support and empirical validation of a societal term

H: Imhof K.

Mediatization and structural change within political actors and organizations

H: Jarren O., Donges P.

The dynamics of political institutions in mediated democracies:

Political bargaining and the transformation of the public sphere

H: Marcinkowski F.

Explaining differences in political news a comparative analysis across four Western democracies and four decades

H: Esser F.

#### Module “Changing Processes and Strategies of Political Participation and Representation – Audience Democracy”

Leader: Siegert G.

The strategies of political actors: process and message

H: Kriesi H.

The strategies and processes of issue selection and construction

H: Siegert G.

The strategies and processes of attitude formation and public participation

H: Bonfadelli H., Wirth W.

#### Knowledge Transfer Module “The Quality of Democracy”

Leader: Ladner A.

Democracy barometer

H: Bühlmann M., Merkel W.

Civic education

H: Ziegler B., Ladner A.

Smart-voting as a tool for electronic campaigning

H: Ladner A., Trechsel A., Leuthold H.

Narrative Space

H: Wyss V.

Democratic processes and political behavior

H: Leuthold H.

Media and democracy monitor

H: Trappel J.

### Programmes

Doctoral programme

Supervisor: Papadopoulos I.

Peer mentoring programme

Supervisor: Hug S., Siegert G.

Center for Comparative and International Studies (CIS), ETH Zürich

SwissGIS / Institut für Publizistik- und Kommunikationswissenschaft, Universität Zürich

Zentrum für Demokratie Aarau (ZDA), Universität Zürich  
Institute of Political Science, University of St. Gallen

Center for Comparative and International Studies (CIS), ETH Zürich

Philosophisches Seminar, Universität Zürich

Institut für Publizistik und Kommunikationswissenschaften, Universität Zürich

## Third Party Cooperation

### Programmes

- Demanc
- EDP
- ERC
- GEG
- GROW-Net
- IMO
- NCCR Trade Regulation
- NEWGOV
- RECON
- SELECTS
- SFB 597
- SVC

### Research Institutions

- Amsterdam Inst. for Advanced Labour, University of Amsterdam, NL
- Centre de Théorie Politique, Université Libre de Bruxelles, BE
- Dept. of Communication, University of California, San Diego, US
- Dept. of Communication, University of Missouri, Columbia, US
- Dept. of Political and Social Sciences, European University Inst. (EUI), Florence, IT
- Dept. of Political Communication, University of Krems, AT
- Dept. of Political Science, Erasmus University, Rotterdam, NL
- Dept. of Political Science, University of Koblenz Landau, DE
- Dept. of Social Cultural Studies, Free University of Amsterdam, NL
- Dept. of Sociology, University of California, Los Angeles, US
- Environmental Policy Research Center, Free University Berlin, DE
- German Inst. for International and Security Affairs (SWP), Berlin, DE
- Inst. for Environmental Decisions (IED), ETH Zurich, CH
- Inst. of Communication Studies, Leeds University, GB
- Inst. of Mass Communication and Media Research, Free University Berlin, DE
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- Inst. of Political Science, University of Munich, DE

## Topics

Well-functioning democratic processes and institutions constitute the backbone of political legitimacy, social stability, economic growth, and prosperity. However, a realistic assessment of the state of democracy today must acknowledge that democratic regimes are faced with serious challenges that threaten to undermine their legitimacy. Citizens in Western democracies are increasingly disillusioned with their political leaders and institutions. Beyond established liberal democracies, the process of democratization has proven to be more difficult than expected.

The NCCR Democracy wants to show why and explain what can be done about it. It examines two key challenges to democracy in the 21<sup>st</sup> century: On the one hand, nation-states are suffering from a severe loss of problem-solving capacity in the wake of globalization. On the other hand, the “mediatization of politics,” i.e. the intrusion of the media into the political process, constitutes a serious threat to traditional models of representative democracy and profoundly alters the character of public debate. While both developments are real threats to the democratic process, they also represent opportu-

nities for new forms of political participation and representation, as well as for political legitimation. The main goals of the NCCR Democracy are to propose designs for new political decision-making processes and to devise strategies to improve the quality of democracy. The NCCR is based on four basic research modules and a fifth applied research module charged with finding practical applications that implement the research results. The NCCR also provides an interdisciplinary doctoral program in its two core disciplines – political science and media and communication science.

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Imhof Kurt, Prof.

Jarren Otfried, Prof.

Koubi Vally, Prof.  
Kriesi Hanspeter, Prof.  
Kübler Daniel, Prof.

Ladner Andreas, Prof.  
Lavenex Sandra, Prof.  
Leuthold Heiri, Dr.  
Marcinkowski Frank, Prof.  
Merkel Wolfgang, Prof.  
Papadopoulos Ioannis, Prof.

Schimmelfennig Frank, Prof.

Siegert Gabriele, Prof.

Trappel Josef, Dr.

Trechsel Alexander, Prof.  
Widmer Thomas, PD Dr.  
Wirth Werner, Prof.

Wyss Vinzenz, Prof.  
Ziegler Béatrice, Prof.

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SwissGIS / Institut für Publizistik- und Kommunikationswissenschaft, Universität Zürich  
Volkswirtschaftliches Institut, Universität Bern  
CIS / Institut für Politikwissenschaft, Universität Zürich  
Institut Sozialplanung und Stadtentwicklung, Fachhochschule Nordwestschweiz  
IDHEAP, Universität Lausanne  
Politikwissenschaftliches Seminar, Universität Luzern  
Geographisches Institut, Universität Zürich  
Institut für Kommunikationswissenschaft, Universität Münster  
Wissenschaftszentrum Berlin für Sozialforschung  
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Zürcher Hochschule Winterthur  
Pädagogische Hochschule der Fachhochschule Aargau Nordwestschweiz

## Achievements

### Multi-disciplinary research

The five research modules have so far produced a common position paper and a first synthesis of research results as well as publications with leading publishers and in major journals in the fields. Furthermore, the NCCR has launched a refereed e-journal Living Reviews on Democracy, providing up-to-date reviews of the state of research in all fields of democracy studies. The NCCR's final research results will show how the two challenges of globalization and mediatization jeopardize or reinforce democracy. They will help to clarify how the two challenges have an effect on governance in established democracies. They will also elucidate the effects of efforts to democratize non-democratic regions and international institutions and show the conditions for successful and peaceful democratization processes. We will also gain insight into how the media influence the political process as well as the consequences thereof.

### Knowledge transfer

The projects in the Knowledge Transfer module each develop a tool – either for democracy research or for the transfer of research results to the public. Some of these tools are already made accessible (such as Politikzyklus, Smartvote) and/or (Democracy barometer) have been presented to the public at the occasion of public events. Three individual research projects have already been completed: The results of

the first project serve now as a decision-making aid for policy-makers to elaborate strategies for the development of Swiss metropolitan areas. The second project identified the risks and potentials of on-line voting assistance tools such as Smartvote from a legal perspective. The third project developed an e-learning course on the Swiss political system for students at Swiss universities. Regarding public relations, the NCCR has organized several meetings with journalists to acquaint them with the NCCR's research, has regularly published a newsletter, and has organized events for a broader public or particular target groups.

### Education and training

The NCCR Democracy provides an interdisciplinary doctoral program. The goal of the program is to enable its participants to obtain Ph.D. degrees of such a quality that they can place themselves at the forefront of their discipline(s) in Switzerland or abroad. The NCCR presently supports the training of 21 NCCR and five external Ph.D. students. The curriculum covers research methods as well as subject-specific and general skills, including professionalization activities such as teaching, conference presentations, scientific writing and publishing strategies. A future goal is also to promote the post-doctoral researchers. The current creation of an NCCR assistant professorship at the University of Zurich is one first step towards this.

The core of our efforts to promote female researchers is the peer mentoring program. The peer group Stepping Stone consisting of 14 female doctoral students and post-docs aims to advance the careers of its members in academia and beyond. It organizes activities designed to develop skills vital to building up successful careers and to create formal and informal networks with peers and senior colleagues from outside the group. The peer mentoring program has been a very positive experience for all of its members, and they consider it one of the most effective forms of supporting the advancement of women in academia.

### Structural effects

The NCCR Democracy initiated the Center for Democracy Aarau (Zentrum für Demokratie ZDA). The ZDA is the first democracy research center in Switzerland and a unique model for a partnership between a municipality (City of Aarau), a canton (Argovia), a university of applied sciences (FHNW) and a university (University of Zurich). The establishment of the center has also led to the creation of a new professorship in Democracy Studies at the University of Zurich. The founding of ZDA is an important measure for institutionalizing the NCCR Democracy and for securing and extending its research and educational efforts in the long run.

Further information see [www.nccr-democracy.uzh.ch](http://www.nccr-democracy.uzh.ch)

- Laboratoire "Communication et politique", Centre national de la recherche scientifique, Paris, FR
- Ludwig Boltzmann Inst. for European History and Public Spheres, Basel, CH
- Nachwuchsgruppe "Mikropolitik bewaffneter Gruppen", Humboldt Universität zu Berlin, DE
- Pädagogisches Institut, Universität Zürich, CH
- Political Science Dept., University of Oslo, NO
- Politics & International Studies, Open University, Milton Keynes, GB
- Professorship "Theory and History of Democracy", Social Science Research Center Berlin, DE
- School of Politics and International Relations, University College Dublin, IE
- Social Sciences Division, University of Oxford, GB
- Vakgroep Politieke Wetenschappen, Vrije Universiteit Brussels, BE
- Zentrum für Sozialpolitik, Universität Bremen, DE

### Economy / Industry

- Bertelsmann Transformation Index, Bertelsmann Stiftung, Gütersloh, DE
- Politools, Bern, CH
- Redaktion Schulfernsehen, Schweizer Fernsehen, Zürich, CH

### Others

- Federal Office of Public Health (FOPH), Bern, CH
- Study Group on Democratization, National Intelligence Council and Intelligence Community, US Government, Washington, US

## Partner Institutions

Institut für Völkerrecht, Universität Zürich

Laboratoire de Sociologie Urbaine, Ecole Polytechnique Fédérale de Lausanne

Schweizerisches Institut für Aussenwirtschaft und Angewandte Wirtschaftsforschung,

Universität St. Gallen

SIDOS, Universität Neuchâtel

Soziologisches Institut, Universität Zürich

Università della Svizzera Italiana, Lugano

Zentrum für Demokratie (ZDA), Aarau

## Statistical Input – Output Data

Funding source (CHF)	Year 1	Year 2	Year 3	Year 4	Total	%
SNSF funding	1 775 000	1 775 000	1 775 000	1 775 000	7 100 000	46
Self-funding from home institution <sup>1</sup>	745 207	759 333	1 064 889	880 570	3 449 999	22
Self-funding from project participants	890 799	1 038 659	1 101 463	984 919	4 015 840	26
Third-party funding	71 992	260 624	431 587	132 534	896 737	6
<b>Total</b>	<b>3 482 998</b>	<b>3 833 616</b>	<b>4 372 939</b>	<b>3 773 023</b>	<b>15 462 576</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	GR	SE	FR	AT	
Management	4.37	6	32	13	68	7	10	2	2	0	0	0
Master students	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral students	30	16	53	14	47	18	10	0	0	1	0	3
Postdoctoral students	5	2	40	3	60	1	3	0	0	0	1	0
Research associates	19	7	37	12	63	9	9	0	0	0	0	2
Senior researchers <sup>4</sup>	46	4	9	42	91	31	10	3	1	1	1	4
Other staff	59	33	56	26	44	53	4	0	0	0	0	2
<b>Total</b>	<b>163.37</b>	<b>68</b>	<b>38</b>	<b>110</b>	<b>62</b>	<b>119</b>	<b>46</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>11</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>3</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>4</sup> Including leaders of the individual projects and other organisational units of the NCCR

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# Swiss Etiological Study of Adjustment and Mental Health

## NCCR SESAM

### Research

**An experimental variation of individual and systemic risk factors:**

**Their significance for etiology and prevention**

Head: Bodenmann G.  
Perrez M.

**Psychobiological programming of the stress response, behavioral self-regulation and parental bonding in infants**

H: Hellhammer D. H.  
Meinlschmidt G., Bolten M.,  
Holzgreve W.

**The impact of grand-parental investment on the health and well-being of children and grandchildren**

H: Hertwig R.  
Wänke M.

**Psychobiological consequences of mental health during pregnancy**

H: Hösli I.  
Holzgreve W., Alder J., Bitzer J.

**A transgenerational perspective on risk factors related to neuroticism, affective and substance use disorders**

H: Mueller-Spahn F.  
Dammann G., Seifritz E.,  
Wilhelm F.

**The genetic basis of major psychopathological phenotypes**

H: Papassotiropoulos A.  
Meyer U.A.

**Primate and rodent models of stress-related disorders: Neurobehavioral studies of interactions between stress in early life and adulthood**

H: Pryce C.  
Knüsel I.

**Postnatal programming of human mesolimbic dopaminergic function**

H: Schächinger H.  
Wilhelm F., Blumenthal T.

**Prospective and retrospective parental memory: The accuracy of autobiographical memories of birth and infancy behavior problems**

H: Schneider S.  
Opwis K., Steinhausen H.-C.

**Social determinants of family environments and children's health**

H: Siegrist J.  
Grob A.

**Triadic family functioning in pregnancy and the first 3 months postpartum: An integrated psychosomatic approach to obstetrics and infant development**

H: Stadlmayr W.  
Bürgin D., Grob A., Favez N.,  
Surbek D.

**Autonomic nervous system activity assessed by spectral analysis of fetal and infant heart rate variability and its relationship to psychosocial development**

H: Wilhelm F.  
Grossman P., Schächinger H.

**Database Project**

H: Bernstein A.

**Non-invasive markers and fetal programming in preeclampsia**

H: Holzgreve W., Surbek D.,  
Alder J., Baumann M., Hösli I.,  
Lapaire O., Mohaupt M.,  
Stadlmayr W.

### Core Study

H: Margraf J.  
Alder J., Bitzer J., Blumenthal T.  
D., Bodenmann G., Bolten M.,  
Bürgin D., Dammann G.,  
Dittrich K., Favez N., Grob A.,  
Grossmann D. P., Hellhammer  
D. H., Hertwig R., Holzgreve W.,  
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Frauenklinik, Universitätsspital Basel  
FBI – Psychobiologie, Universität Trier  
Psychologisches Institut, Universität Zürich  
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# Swiss Etiological Study of Adjustment and Mental Health NCCR SESAM

## Third Party Cooperation

### Programmes

- SHARELIFE Employment and health at 50+: A life history approach to European welfare state interventions
- (CIT 028812)

### Research Institutions

- Center for Family Research, University of Lausanne, CH
- Child and Family Research Inst., Center for Community Child Health Research, Vancouver, CA
- Dept. für Psychologie, Persönlichkeitspsychologie, Psychologische Diagnostik und Familienpsychologie, Universität München, DE
- Dept. of Child and Adolescent Psychiatry, University of Berne, CH
- Dept. of Psychology, University of California, Los Angeles, US
- Dept. of Psychology, University of Warwick, GB
- Fakultät Rehabilitationswissenschaften, Universität Dortmund, DE
- Inst. für Psychologie, Abt. Klinische Psychologie, Psychotherapie und Diagnostik, Technische Universität Braunschweig, DE
- Inst. of Psychiatry, Kings's College, London, GB
- Lehrstuhl für Entwicklungsförderung und Diagnostik, Humanwissenschaftliche Fakultät, Universität Köln, DE
- Zentrum für Klinische Psychologie und Rehabilitation, Universität Bremen, DE

### Economy / Industry

- F.Hoffmann-La Roche AG, Basel, CH

### Others

- Freiwillige Akademische Gesellschaft, Basel, CH

## Topics

Mental health is one of the societies most precious commodities. The rapid rise in emotional disorders is a growing cause for concern. According to WHO estimates, depression will be the second most important cause of premature death and health impairment by 2020. The fundamental topic of the NCCR sesam is to elu-

cidate the complex interplay of psychological, physiological, social and biological factors that may influence the development of mental health in human development. To reach this goal, the NCCR sesam created an interdisciplinary network of scientists from different disciplines which work together on this general goal of sesam. Initially,

the overall research design included one core-study and several independent individual projects. Within the core-study, sesam aimed to study the longitudinal development of mental health in 3000 children and their families, beginning in pregnancy and following them up until age 20 years.

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Department of Neuroscience, F. Hoffmann-La Roche Ltd., Basel

## Achievements

### Research

Due to the low recruitment rate, the recruitment for the sesam core-study was stopped in March 2009, while individual studies that recruit individuals independent of the core-study are still ongoing. Therefore, the NCCR sesam in its originally designed form will be finished after the first funding period in 2009.

The ongoing individual focus on research topics such as the impact of family socialisation factors on child development, the psychobiological programming of stress response, the psychobiological consequences of mental health during pregnancy, maternal sensitivity and amygdala functioning, the postnatal programming of human mesolimbic dopaminergic function, family functioning as well as the relationship between fetal heart rate variability and psychosocial development of children. In ongoing prestudies, new methods (e.g., digital diaries, specific questionnaires, translated questionnaires or methods for the collection of biological samples) that have been developed for the application within the core study are evaluated. It has to be mentioned that due to the long and complicated process of ethical evaluation, the start of the recruitment within the whole NCCR was markedly delayed.

Scientific achievements that have been obtained so far include the successful completion of one individual project (Primate and rodent models of stress-related disorders: Neurobiological studies of interactions between stress and early life; PI: Pryce, C. & Knüsel, I) in the first year. Results that have been obtained in this project have already successfully been published. Further, a broad range of new methods (see above) including the development of a specific translation concept as well as the

translation of specific questionnaires have been established, which are currently being evaluated in separate studies. Papers addressing these evaluations are in preparation. Due to the delay of the start of recruitment, papers based on data that were obtained directly from the research carried out in the ongoing individual studies will be published in the next years. Nevertheless, other research activities of sesam team members that address research topics close to sesam led to an output of more than 100 peer reviewed papers since 2005 not including a series of book chapters and abstracts.

Other scientific achievements that have been obtained so far include the development of a sophisticated security concept and the development and implementation of a highly secure database schema as well as several client applications.

### Education and training

Specifically for sesam, an education and training program has been developed and well established. The program includes several components for master and PhD students. For master students, a specific master program was established and integrated into the Faculty of Psychology. Until today, 38 master students have been/are enrolled in the sesam master program. For PhD students, the NCCR sesam established a PhD program that includes - besides the individual and peer mentoring by junior and senior scientists - training activities such as a journal club, workshops, an interdisciplinary research colloquium and also an annual summer school. Two summer schools have successfully been realized so far. The annual evaluation of the program showed that it is largely appreciated by the students. Especially the scientific career of young female scientists is strongly supported by

the recruitment of predominantly female PhD students. A total of 29 PhD studies have been launched so far, of which 2 are already completed.

### Organisational and Structural Development

The NCCR sesam has been responsible for intensive, interdisciplinary cooperation in the life sciences area. Within this framework, many new cooperative research efforts (e.g. projects between various University's Research Departments and the nine medical hospitals, and the cooperative projects with several high ranking, high profile studies) have been established. Partly, as a result of the NCCR sesam initiative, high calibre scientists and professors have been attracted and recruited to meet the University of Basel's personnel requirements.

Since the start of the NCCR sesam, in the year 2005, important advancements within the various functional units and the infrastructure have been set in place. At the NCCR headquarter in Basel, a research centre has been developed, with up to fifty personnel. Established here are the knowledge and the know-how, with the appropriate infrastructure for research within the behavioural-biological area. This also includes the areas of physiological, medical and analytical biochemical laboratory testing, biological IT-supported databases, outpatient assessment, telephone and postal surveys and interviews, and statistical analyses. It gives the flexibility and ability of mixing and combining all these techniques as needed. The research centre also meets the highest requirements of personal data security, specialist psychological and psychiatric software application development, and research quality.

Further information see [www.sesamswiss.ch](http://www.sesamswiss.ch)

## Statistical Input – Output Data

Funding source (CHF)	Year 1	Year 2	Year 3	Year 4	Total	%
SNSF funding	2 480 000	2 480 000	2 600 000	2 640 000	10 200 000	55
Self-funding from home institution <sup>1</sup>	164 349	449 272	657 582	1 037 801	2 309 004	12
Self-funding from project participants	809 197	900 156	768 056	728 683	3 206 092	17
Third-party funding	157 574	209 922	1 757 345	725 160	2 850 001	15
<b>Total</b>	<b>3 611 120</b>	<b>4 039 350</b>	<b>5 782 983</b>	<b>5 131 644</b>	<b>18 565 097</b>	<b>100</b>

Personnel <sup>2</sup>	Total of Persons	Female	%	Male	%	CH	Most Represented Nations					Other Nations
							DE	FR	AU	AT	CA	
Management	7.48	6	35	11	65	5	4	2	1	0	2	4
Master students	32	23	72	9	28	23	7	0	1	0	0	2
Doctoral students	33	31	94	2	6	17	10	0	0	0	0	6
Postdoctoral students	3	2	67	1	33	0	2	0	1	0	0	0
Research associates	11	6	55	5	45	6	3	0	0	0	0	3
Senior researchers <sup>4</sup>	28	4	14	24	86	11	17	0	0	1	0	1
Other staff	37	24	65	13	35	21	7	2	1	1	0	5
<b>Total</b>	<b>151.48</b>	<b>96</b>	<b>60</b>	<b>65</b>	<b>40</b>	<b>83</b>	<b>50</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>21</b>

<sup>1</sup> Personnel costs, equipment and consumables, not included infrastructure and basic equipment

<sup>2</sup> Persons involved in the NCCR in the last reporting period (12 months)

<sup>3</sup> Full-time equivalent, including NCCR-Director and persons in charge of knowledge and technology transfer, and education and training

<sup>4</sup> Including leaders of the individual projects and other organisational units of the NCCR

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# Affective Sciences: Emotion in Individual Behaviour and Social Processes

## NCCR Affective Sciences

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**Start of the NCCR**  
September 1, 2005

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## Research

### Area "Emotion Elicitation and Perception"

Appraisal and motivational  
processes in the elicitation  
of emotion

Heads: Scherer K.R.,  
Gendolla G.

### Response patterning

H: Scherer K.R., Kaiser S.

Neural architecture of  
emotion perception and  
affect-related cognition

H: Vuilleumier P., Landis T.

### Area "Emotion Regulation"

Individual and social  
regulation of emotions in  
the family

H: Perrez M., Reicherts M.

Work and emotions:  
issues of stress and social  
interactions and their  
relationship to well-being,  
health, and productivity

H: Semmer N.K., Tschann F.

Emotion regulation,  
impulsivity, and executive  
functions

H: van der Linden M.

### Area "Social Functions of Emotion"

Emotional foundations  
of norm compliance and  
norm enforcement

H: Fehr E.

Emotions, values, and norms

H: Mulligan K.

The importance of emotions  
in social and legal regulation

H: Flückiger A., Roth R.

Myths and rites as cultural  
expression of emotion

H: Borgeaud P.

### Research Foci

Empathy and prosocial  
behaviour in the lifespan

H: Labouvie-Vief G., Singer T.

Antisocial and impulsive  
behaviour

H: Van der Linden M., Eliez S.

Self-reflexive emotions

H: Mulligan K., Gendolla G.

Language and culture

H: Borgeaud P., Scherer K.R.

Aesthetic emotions

H: Lombardo P., Scherer K.R.

Appraisal processes in  
decision making

H: Fehr E., Wranik T.

The Nature and Consequences  
of Gender Differences

H: Kaiser S., Schmid Mast M.

Methodological Development

H: Renaud O.

## Programmes

Graduate School

Post-Doc Program

Workshops

Colloquium

Summer/Autumn  
Academies

Female Careers: Special  
Stipends and Mentoring

Lab Rotation

Invited Professorships

## Affective Sciences: Emotion in Individual Behaviour and Social Processes

### NCCR Affective Sciences

#### Public Relations

- Newsletter
- Presentation  
Swiss Houses
- Website
- Participation in radio and TV programs
- Newspaper, magazine interviews and articles
- Nuit de la Science
- Cité des Métiers
- Semaine du Cerveau
- Salon de l'étudiant
- Le temps d'une découverte, Université de Genève
- Journée des filles

#### Third Party Cooperation

##### Programmes

- ENABLE
- ICCRA
- INTACT

##### Research Institutions

(foreign only)

- Adaptive Systems Research Group, University of Hertfordshire, Hatfield, GB
- Affective Neuroscience Lab, University of Wisconsin, Madison, US
- Brain and creativity Inst., University of Southern California, Los Angeles, US
- Centre de droit privé fondamental, Université Robert Schuman, Strasbourg, FR
- Centre de Recherche Psychotropes, Santé Mentale, Société (CNRS-INSERM) - Université René Descartes, Paris, FR
- Centre européen d'enseignement et de recherche en éthique, Strasbourg, FR
- Centre for the Study of Emotion at the University of Portsmouth, GB
- Cognitive psychopathology Unit, University of Liège, BE
- Computational Neuroscience Group, Kings College of London, GB
- Dept. of History and Archaeology, University of Crete, GR
- Dept. of Philosophy, University of Lund, SE
- Dept. of Philosophy, University of Montreal, CA
- Dept. of Philosophy, University of Toronto, CA
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- Dept. of Psychology, Ghent University, BE
- Dept. of Psychology, Harvard University, Boston, US
- Dept. of Psychology, Northwestern University, Chicago, US
- Dept. of Psychology, Princeton University, US
- Dept. of Psychology, Rutgers University, Brunswick, US
- Dept. of Psychology, Stanford University, Palo Alto, US

#### Topics

As part of the ongoing “affective revolution” in many different fields of study, this interdisciplinary research centre investigates of human emotion from various research viewpoints and on several levels of analysis. Many disciplines are represented in this NCCR: psychology, neuroscience, sociology, philosophy, law, comparative anthropology, psychiatry, and economy.

Research issues being addressed by the NCCR fall into three major areas:

1) Emotion elicitation and response patterning (the role of brain structures, individual predispositions,

cognitive appraisal, and situational factors; patterning of emotional responses and action tendencies; communication of emotion);

2) Emotion regulation (control of bodily reactions and feelings by social norms and interpersonal expectations; ability to cope with emotions to avoid stress and burnout; loss of control as a risk factor for affective disorders such as pathological anxiety and depression);

3) Emotion in social processes (affective processes in family, workplace, and society as a whole; the role of social norms and values in

shaping the nature of the emotional response and its control; the role of religion and myths; the socializing function of shame; effects of economic and socio-political changes on affective experiences and well-being).

Special emphasis is being placed on the application of research findings as well as joint research activities with transfer partners in order to deal with social issues in the areas of health, work and organizations, the family, law, the problem of violence, economics, and the arts. The NCCR is also committed to training the first generation of “affective scientists”.

#### Heads of Individual Research Projects and Associates

**Borgeaud Philippe, Prof.**

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Gendolla Guido, Prof.

**Kaiser Susanne, Prof.**

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**Landis Theodor, Prof.**

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Departement of Philosophy, University of Cincinnati, US

Departement of Psychology, University of Marburg, DE

## Achievements

### Research

The ten research projects conducted within the NCCR Affective Sciences have demonstrated a high level of productivity in research and publication activities. The individual projects, often in collaboration with each other, have made major contributions to the state of the art in the Affective Sciences, with the results published in major international journals and books. Some of the major highlights are: the experimental confirmation of cumulative-sequential processing of external stimuli; the creation of a reference corpus and data bank of emotional expressions; the assessment of the role of social context and personality on our brain's response to other people's emotions; the demonstration that ambulatory assessment is a very efficient and promising method to investigate emotion regulation in families; the confirmation that social stressors at work impact on the body mass index over time; the experimental confirmation that lack of perseverance is related to interference in working memory and urgency to response inhibition; the demonstration that intranasal administration of the neuropeptide Oxytocin, which plays a central role in social approach behaviour in nonhuman mammals, causes a substantial increase in trust in humans; the conceptual analysis of the nature of shame and guilt, which led to the description of fundamental distinctions between these two emotions; the analysis of the emotional issues related to individual attitudes towards organ donation; the comparison of the emotional aspects of myths and rites in different ancient and classical cultures.

One of the outstanding successes has been the performance of the interdisciplinary NCCR's Research Foci: Aesthetic emotions, Anti-social and impulsive

behavior, Appraisal and decision-making, Empathy, Language and culture, Gender, and Self-reflexive emotions. In addition to a large number of pluridisciplinary international workshops and symposia, several collaborative research projects between scientists from different fields have been designed and/or are currently being conducted. The Transversal Module "Methods" has produced several important toolboxes to be shared within the NCCR. The NCCR is also a leading partner in the establishment of the new Brain and Behavior Laboratory which combines, in a single facility, top notch brain imaging and psychophysiological recording equipment with virtual reality tools used to elicit emotions.

The number of associate members of the NCCR appointed by the Steering Board has increased to 29. These associate members are academics and professionals from inside and outside Switzerland who contribute to the work of our projects and research foci.

Research expertise of several scientists has been acknowledged by prizes and grants such as the Marcel Benoist prize (E. Fehr), the Théodore Ott prize (T. Landis), ERC Starting grants (G. Pourtois, T. Singer), and an ERC Advanced grant (K. R. Scherer).

### Education and Training & Advancement of women

The NCCR's interdisciplinary doctoral program currently has 26 students registered. The postdoctoral program has been successfully launched. In the past years, the Education and training program has been involved in the organization of many thematic and/or methodological meetings with invited speakers from home and abroad. It also offers grants to participate in conferences or to visit external laboratories. In 2009, the

NCCR will launch the first International Summer School in Affective Sciences. In order to support young researchers with family responsibilities, the NCCR has implemented stipends to help with day care costs and allow researchers to pursue their academic career.

### Knowledge transfer & Public information

The NCCR is committed to transferring scientific knowledge of human emotion gained from research to the wider society. Successful associated projects are being conducted with Firmenich, a world leader in fragrance research and production, the Swiss Household Panel, and an international association of telephone helpline organizations. Contacts with further external partners are currently evolving towards research contracts.

During the past years, researchers participated in several major events aimed at the general public, in cooperation with the University of Geneva. The NCCR also organized popular-science events for the university community. It has responded to numerous requests from TV, radio, and print media for information on our research by providing experts for interviews and by writing popular-science articles on topics ranging from the role of emotion in soccer games during the Eurofoot 2008 to love and its neural bases. The NCCR has also an ambitious program of collaboration with local museums with several exhibitions planned around the topic of emotions. Its large website continues to draw an international audience from both the academic community and the general public. Finally, the NCCR publishes a quarterly newsletter widely distributed both inside and outside the NCCR.

Further information see [www.affective-sciences.org](http://www.affective-sciences.org)

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- Dept. of Psychology, University of Berkeley, US
- Dept. of Psychology, University of Birmingham, GB
- Dept. of Psychology, University of Chicago, US
- Dept. of Psychology, University of Gent, BE
- Dept. of Psychology, University of Graz, AT
- Dept. of Psychology, University of Munich, DE
- Dept. of Psychology, University of Sheffield, GB
- Dept. of Psychology, University of Singapore, SG
- Dept. of psychology, University of Stanford, Palo Alto, US
- Dept. of Psychology, University of Würzburg, DE
- Dept. of Psychology, Uppsala University, SE
- Dept. of Psychology, Yale University, New Haven, US
- Douglas Psychiatry Research Hospital, McGill University, Montreal, CA
- Embodied Agents Research Group, German Research Centre for AI (DFKI), Saarland University, Saarbrücken, DE
- Environnements Virtuels pour l'Animation et la Synthèse d'Images d'Objets Naturels, Inst. National de Recherche en Informatique et en Automatique Rhone-Alpes, Grenoble, FR
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- Inst. Communication Parlée, Université de Grenoble, FR
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