EPFL - ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE

ROLEX LEARNING CENTER

PRESS INFORMATION

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Rolex Learning Center

Built on the campus of Ecole Polytechnique Fédérale de Lausanne (EPFL), The Rolex Learning Center functions as a laboratory for learning, a library and an international cultural hub for EPFL, open to both students and the public. Spread over one single fluid space of 20,000 sq meters, it provides a seamless network of services, libraries, information gathering, social spaces, spaces to study, restaurants, cafes and beautiful outdoor spaces. It is a highly innovative building, with gentle slopes and terraces, undulating around a series of internal 'patios', with almost invisible supports for its complex curving roof, which required completely new methods of construction. The building opened this year to the students and public on the 22nd of February and was inaugurated on May 27th, 2010.

A MODERN LIBRARY

The main library, containing 500,000 printed works, is one of the largest scientific collections in Europe; four large study areas can accommodate 860 students with office space for over 100 EPFL and other employees; a state-of-the-art multimedia library gives access to 12,000 online journals and over 20,000 e-books, with advanced lending machines and systems for bibliographic search; a study center for use by postgraduate researchers provides access to the university's major archive and research collection, and there are learning areas including 10 'bubbles' for seminars, group work and other meetings.

A PUBLIC SPACE

The Rolex Forum, an amphitheatre with a stage of 310m^2 is a venue for up to 600 people, to be used for conferences, lectures, performances and other large scale events. A variety of catering outlets includes a self-service cafeteria and, at one of the summits of the building, a high quality restaurant with outstanding views of Lake Geneva and the Alps, all open to the public. Everybody, including those outside EPFL, can come to consult books or to work on the premises.

INNOVATIVE ARCHITECTURE

The Rolex Learning Center is a large one room space. Five external patios, intimate courtyards are sympathetically landscaped with informal seating, providing outdoor relaxation areas for visitors and students. The building undulates, lifting up along each of its sides to allow visitors to enter through one main central entrance. The floor undulations and curved patios not only softly divide the different programs but also connect in a gradual and calm manner. In comparison to traditional study spaces, where corridors and classrooms are clearly separated, we hope that there will be many different ways to use the new space and that there will be more active interaction, which in turn will trigger new activities.

A WORD FROM EPFL PRESIDENT

"The Rolex Learning Center," Patrick Aebischer, President of EPFL, said, "exemplifies our university as a place where traditional boundaries between disciplines are broken down, where mathematicians and engineers meet with neuroscientists and microtechnicians to envision new technologies that improve lives. We invite the public into this space to convey the message that working in science is working for the advancement of society."

A Building for Learning

The Rolex Learning Center is above all a library and learning space devoted to the cultivation of knowledge by an array of different methods. It has one of the largest collections of scientific literature in Europe, with over 500,000 volumes. In addition, an exciting range of new pedagogical technologies in the building, as well as the layout itself, are innovations to the public's approach to texts and learning.

OPEN SPACE

The most audacious aspect of the new library is its lack of physical boundaries. The large open space is defined by its artificial geography – an interior landscape. It groups silent and calm zones along its hills and slopes, rather than offering traditional cloistered study rooms. Recognizing the importance of social interaction to learning, the open space experience encourages solidarity between students in the struggle to obtain the best individual academic results, and an open flow of ideas to improve collaborative efforts.

ACCESS TO INFORMATION

Book loans can be done en masse – with RFID students can check a pile of books out and return them by placing the pile on an electronic shelf along with their card. As the technology progresses, it should also be possible to locate a book on the shelves using a smart-phone app.

PRECIOUS BOOKS

Since its move to the new campus in 1968, EPFL has purchased a number of important antique volumes of scientific literature. The collection comprises rare editions dating from the 16th century, which include works by Newton and Galileo, and will be housed in a special display case as a central feature of the new building.

A LEARNING LAB – THE CRAFT

The CRAFT Laboratory is the Center for Research and Support of Training and its Technologies – an avant-garde approach that combines computer interfaces with real world interaction to improve learning techniques and spaces. Already developed learning technologies for the CRAFT lab include interactive furniture, paper/computer interfaces, and eye-tracking devices.

Future technologies for the new library are already on the drawing board. They are extensions of previously developed CRAFT technologies adapted to the new learning environment. Among the proposed future technologies is an interactive lamp fitted to existing tables. It would allow the public to project short messages onto the wall or ceiling of the building, indicating study themes, moods, or an appropriate level of noise for the area. Along the same theme, a real-time map of the building could indicate the noise levels of different areas in library, or show the texts the users have typed into the tables.

Architecture

Designed by the Japanese architectural practice SANAA, led by Kazuyo Sejima and Ryue Nishizawa, the Rolex Learning Center is a radical and highly experimental building, designed for new ways of study and interaction in the 21st century.

A LIGHT AND ORGANIC SHAPE

Located centrally on the EPFL campus – as its new hub – the building is essentially one continuous structure spread over an area of 22,000m^2: The building is rectangular in plan, but appears to be more organic in shape because of the way that its roof and floor undulate gently, always in parallel. With few visible supports, the building touches the ground lightly, leaving an expanse of open space beneath which draws people from all sides towards a central entrance.

SLOPES INSTEAD OF WALLS

Inside, the hills, valleys and plateaus formed by the undulation often make the edges of the building invisible, though there are no visual barriers between one area and the next. Instead of steps and staircases, there are gentle slopes and terraces. Clearly, but without dividing walls, one area of activity gives way to another. Visitors stroll up the gentle curves, or perhaps move around the space on one of the specially designed 'horizontal lifts', elegant glass boxes, whose engineering is adapted from everyday lift design.

As well as providing social areas and an impressive auditorium, the building lends itself to the establishment of quiet zones and silent zones, acoustically separated areas created through changes in height. The slopes, valleys and plateaus within the building, as well as the shapes made by the patios, all contribute to these barrier-free delineations of space. In addition, clusters of glazed or walled 'bubbles' make small enclosures for small groups to meet or work together in.

PATIOS – ENCLOSURE AND ENCLOSED

The topography lends an extraordinary fluidity to the building's flexible open plan – a flow that is emphasized by fourteen voids in the structure, of varying dimensions. These are glazed and create a series of softly rounded courtyards or external 'patios', as the architects describe them. The patios are social spaces and provide a visual link between the inside and the outside. They are very much part of the building.

From the higher areas, visitors may enjoy views not only of the campus but, spectacularly, of Lake Geneva and the Alps.

AN INTIMATE PUBLIC SPACE

With all its unity and variety, the Rolex Learning Center is, as described by Kazuyo Sejima on the announcement that SANAA had won the architectural competition, an 'intimate public space'.

DESIGNED FOR SCIENTIFIC RESEARCH

The Rolex Learning Center embodies the aims and philosophy of the EPFL, setting the scene for different kinds of collaborative, cross-disciplinary research, regarded as essential to advances in science and technology. It offers flexibility to use the building in many different ways, now and in the future, to absorb new technology and working methods, as they come on stream, many of them developed within EPFL itself. The building emphasises sociability, getting together for coffee, for lunch, for study, for seminars, to stimulate informal encounters between people of all the key disciplines. It is designed to be a landmark, a place people will want to visit, allowing EPFL to reach out to the surrounding community and internationally.

Engineering and Construction

The engineering and construction of the Rolex Learning Center is highly experimental and innovative.

DESIGN OF THE CONCRETE SHELLS

For the 3-dimensional curved concrete shells, SANAA worked with structural engineer, SAPS, to find the shapes with the least bending stresses by making computer simulations during the first phase. Bollinger + Grohmann, from Frankfurt a. M. and Walther Mory Maier, from Basel were responsible for the structural engineering for the whole design process and the execution.

CONSTRUCTION: PRECISION AND INNOVATION

For the construction, SANAA worked closely with the total service contractor, Losinger Construction, on the final calculations and physical implementation of such large and gentle slopes. The concrete execution had to be precise because of the complex façade system that needed to absorb both the concrete shell deflection movement and the construction tolerances. One example of precise execution was the use of laser-cut 2.5m x 2.5m wooden formwork, which was positioned using GPS technology on site. For the ventilation and heating, the undulating one-room volume was also studied via computer simulation to determine the periods when natural ventilation was possible and when floor heating would be necessary. This helped to achieve a low energy consumption target.

SHELLS

Essentially, the building is made up of two ‘shells’. Inside the two shells are 11 under-stressed arches. The smaller shell sits on four arches, 30-40 meters long, while the larger shell rests on seven arches, 55-90 meters long. The arches are held by 70 underground pre-stressed cables.

MATERIALS

The main structural materials are steel and wood, with concrete poured into formwork so precise that the underside of the building looks polished. The floor is a concrete structure, the roof steel and wood; the floor and roof run parallel to each other. To follow the geometry of the shells required 1400 different moulds for concrete. The concrete pouring involved delivering concrete continuously over a period of two days, to achieve the complex task of creating one continuous flowing floor-space.

MOVEMENT

As the building is made up of a single structure, all the elements, including the roof, have to be flexible, to accommodate minute changes in dimension caused by natural and structural movements. The internal ceilings are jointed to accommodate these shifts. The curved glass façades, including those that wrap around the patios, with a total area of 4800 m2, also have to take the movement of the concrete: each piece of glass is cut separately, and each piece moves independently on jointed frames.

ENERGY EFFICIENCY

The Rolex Learning Center is a highly energy-efficient building which, for its low energy consumption, has received the coveted Minergie label – the standard used in Switzerland for measuring environmental excellence in buildings.

The building is largely daylit with carefully controlled natural ventilation systems, except for the restaurant and multimedia library, which have cold ceilings. It achieves a 38.5 kWh/m2 (139 MJ/m2) energy consumption thanks to high quality double-glazed windows, 20cm of insulation in the roof and up to 35 cm in the ground, exterior blinds, natural lighting and ventilation, and because it takes advantage of the 25-year-old installation of thermal pumps that use lake water for cooling the whole campus. This degree of energy efficiency was achieved by the pioneering engineering firm Sorane SA, based near to the campus and comprised of engineers from Lausanne and Zurich. Using digital modelling for airflow, lighting, and thermal measurements, the firm increased the energy efficiency of the new building to a technical maximum while at the same time ensuring the safety of its users in case of a fire. Obtaining the Minergie label is an even more outstanding achievement given the energy challenges of an open plan building.

Architecture Fact Sheet

NAME OF BUILDING	Rolex Learning Center
LOCATION	EPFL (Ecole Polytechnique Fédérale de Lausanne) 1015 Lausanne, Switzerland
SCHEDULE	Competition 2004 Construction 2007 – 2009 Opening February 22, 2010
CONSTRUCTION COST	110 Million CHF
CLIENT	EPFL (Ecole Polytechnique Fédérale de Lausanne)
PROJECT LEADERSHIP	Patrick Aebischer, President of EPFL Francis-Luc Perret, Vice-President for Planning and Logistics of EPFL Vincent Joliat, Project Manager
ARCHITECT	Kazuyo Sejima + Ryue Nishizawa / SANAA Team: Yumiko Yamada, Rikiya Yamamoto, Osamu Kato, Mizuko Kaji, Naoto Noguchi, Takayuki Hasegawa, Louis-Antoine Grego (Former staff: Tetsuo Kondo, Matthias Haertel, Catarina Canas)
ADDRESS	1-5-27 Tatsumi, Koto-ku 135-0053 Tokyo, JAPAN Email: sanaa@sanaa.co.jp
TOTAL SERVICE CONTRACTOR	Losinger Construction SA Bussigny, Switzerland Commercial Phase: *Bernard Chauvet, Directeur Délégué Agence valdo-genevoise Construction Phase: *Eric Maïno, Directeur Exploitation *Cédric Luce, Chef de Service Adjoint
PROJECT MANAGEMENT	Botta Management Group AG Baar, Switzerland *Charles R. Botta, President, CEO *Pierre Eller, Project Manager
LOCAL ARCHITECT	Architram SA Renens, Switzerland *François Vuillomenet, Associate *Dominik Buxtorf, Associate
STRUCTURAL BASE CONCEPT	SAPS / Sasaki and Partners Tokyo, Japan *Mutsuro Sasaki *Ayumi Isozaki, Hirotoshi Komatsu, Hideaki Hamada
STRUCTURAL ENGINEER	B+G Ingenieure Bollinger und Grohmann GmbH Frankfurt am Main, Germany *Manfred Grohmann *Agnes Weilandt Walther Mory Maier Bauingenieure AG Münchenstein, Switzerland *Rene Walther *Gilbert Santini BG Ingénieurs Conseils SA Lausanne, Switzerland *Michel Capron Losinger Construction SA Bussigny, Switzerland *Jean-Benoit Leroux

MECHANICAL / HVAC ENGINEER	Enerconom AG Bern, Switzerland *Rolf Moser
ELECTRICAL ENGINEER	Scherler Ingénieurs-Conseils SA Lausanne, Switzerland *Jacques Mühlestein
FAÇADE CONSULTANT	Emmer Pfenninger Partner AG Münchenstein, Switzerland *Steffi Neubert
ENERGY CONCEPT	Sorane SA Ecublens, Switzerland *Pierre Jaboyedoff
ACOUSTIC CONSULTANT	EcoAcoustique SA Lausanne, Switzerland *Victor Desarnaulds
SECURITY CONSULTANT	BG Ingénieurs Conseils SA Lausanne, Switzerland *Thierry Visinand
MEASUREMENT, CONTROL REGULATION (MCR)	Consulting Energy Control SA Plan-les-Ouates, Switzerland *Michaël Briffaz
GEOTECHNICAL SERVICES	Karakas & Français SA Lausanne, Switzerland *Christian Voit
SURVEYOR	Truffer-Renaud-Burnand Sàrl Renens, Switzerland *Daniel Meier

Building Details

FOOTPRINT	20,200sqm (166.5m x 121.5m)
FLOOR AREA	37,000sqm
NUMBER OF FLOORS	1 Basement + 1 Main
MAIN PROGRAMS	Multimedia Library – 500,000 volumes Student Workspaces – 860 seats Multipurpose Hall “Forum Rolex” – 600 seats Café + Bar – 53 seats + exterior Food Court – 128 seats + exterior Restaurant – 80 seats Career Center Library Staff Office EPFL Precious Book Collection Student Association Office – “AGEPoly” Alumni Association Office – “A3” Pedagogy Research Office – “CRAFT” Publication Office – “PPUR” Bank – “Credit Suisse” Bookshop – “LA fontaine” Parking – 500 places

STRUCTURE	Civil Works, including foundation and piles: *Losinger Construction SA (Bussigny, Switzerland)* Concrete for “shell” provided by: *Holcim SA, (Bussigny, Switzerland)* Pre-stressed cables: Freyssinet SA *(Moudon, Swizerland)* Roof steel beams, columns, braces: *SOTTAS SA (Bulle, Switzerland)* Roof wood beams: *Ducret-Orges SA (Orges, Switzerland)*
TECHNICAL	Electrical: *EP Electricité SA (Genève, Switerland)* Electrical*: Etablissements Techniques Fragnière SA (Bulle, Switzerland)* Ventilation and Measurements, Controls, Regulation: Consortium Alvazzi / Atel *(Crissier, Switzerland)* Floor heating: Baruchli SA *(Lausanne, Switzerland)* Sanitary, Plumbing: *Riedo Clima SA (Bulle, Switzerland)* Architectural lighting on main level: *Zumtobel Lumière SA (Romanel-sur-Lausanne, Switzerland)*
EXTERIOR	Glass façade system with anodized aluminum facia and sun protection box: *Roschmann Konstruktionen aus Stahl und Glas GmbH (Gersthofen, Germany)* Louver sun protection: *WAREMA Schweiz GmbH (Littau, Switzerland)* Sika Sarnafil flexible waterproof membrane roof surface: *Pilatus Flachdach AG (Samstagern, Switzerland)* Concrete walkway covers: *Losinger Construction SA (Bussigny, Switzerland)*
INTERIOR	Screed: *LIROM Chapes SA (Le Landeron, Switzerland)* Carpet flooring: *Interior Services SA – Pfister (Etoy, Switzerland)* BASWAphon mineral plaster acoustic ceiling: *Clément Peinture SA (Fribourg, Switzerland)* Plasterboard + paint on “bubbles”: *DUCA SA (Cheseaux-sur-Lausanne, Switzerland)* Expanded metal partitions: *R. Morand & Fils SA (La Tour-de-Trême, Switzerland)* Steel railings with polycarbonate, or expanded metal infill: *R. Morand & Fils SA (La Tour-de-Trême, Switzerland)* Curved glass for Credit Suisse and flat glass for meeting rooms: *GLAS TRÖSCH AG (Bützberg,Switzerland)* Inclined elevator: *Weiermann Systems AG (Wynigen, Switzerland)*
FURNITURE	Information desks in anodized aluminum + acrylic: *Actoform SA (Ecublens, Switzerland)* Anodized aluminum library bookshelves with lamps: *Unifor Spa (Turate, Italy)* Student work tables with lamps: Developed by *Schoch Werkhaus AG (Winterthur, Switzerland)* Glass precious books collection case: *Bodenmann J. SA (Le Brassus, Switzerland)* SANAA Flower Chair: *Vitra AG (Birsfelden, Switzerland)* Vitra office furniture: *Teo Jakob Tagliabue SA (Geneva-Carouge, Switzerland)* Fritz Hansen tables and chairs: *Batiplus SA (Lutry, Switzerland)*

*For complete list of contractors, or more information, please contact EPFL.

An interview with the architects, Kazuyo Sejima + Ryue Nishizawa

What was the process that led to your final design?
The Library, multipurpose hall, café, and many other different programs were stacked to make a tall multi-storey tower in our first studies. But finally, as the program defined a meeting place for students engaged in many fields of study we felt that everything on one floor and in one room was best. We did not make a normal one-room space but incorporated patios and topography to organise the program such that each is separated and connected at the same time. The large one-room space undulates up and down creating an open space under the building so that people can walk to the center of the building. This enabled us to make one main entrance at the center of the building.

What were your influences and inspiration for the design?
It is not that we had a particular shape in mind. We arrived at what we thought was the most appropriate shape by studying the required program and the relationships between individual parts. In other words, we asked ourselves: what kind of space can a lot of people, doing different activities at the same time, enjoy being in? After we had the final shape, we used stairs and ramps from Lausanne and the Swiss landscape as precedents to learn how the gentle slopes can be used and enjoyed.

What do you think good architecture can contribute to the process of learning?
The whole program is located in a one-room space, where people studying one topic might become interested in another because the space is very open and connected. We imagined that this type of open space might increase the possibility for new meetings or trigger new activities. In comparison to traditional study spaces, where corridors and classrooms are clearly separated, we hope that there will be many different ways to use the new space and that there will be more active interaction, which in turn will trigger new activities.

The Rolex Learning Center is a highly innovative building. Can you tell us about the client's original brief?
This education center, made up of a library, multipurpose hall, café, restaurant and offices is a central element in the campus plan, not only the EPFL plan but also the adjacent university plan. Unlike a traditional library, the client wanted to create a new type of space where many different fields of study exchange knowledge freely and easily.

Could you describe some of the technical challenges involved in realising it?
The long span shells in the structure; the 3-dimensional topography and its relationships to the program; realising a building made outside of Japan; the arrangement of slopes, stairs, and the inclined elevator were some of the challenges.

The topography of the Rolex Learning Center is unique. Can you talk about the human experience of inhabiting it might be like and how people might use it?
This building has both architectural and topographical qualities so the experiences will be diverse. The act of entering or exiting a room, or studying at a desk might be an architectural experience but to criss-cross a slope, or to climb it with the funicular-like inclined elevator might be an experience closer to being on a hill outdoors. Also, the topography created by the architecture will induce architectural experiences that have not been felt in traditional buildings. When standing on top of the hill, you might not see the other hill but might hear faint voices, or you might not be able to see the other place but your body can sense there is a connection to another space. Unlike traditional one-room spaces, new relationships will emerge and we hope this will create a new type of architectural experience.

How does the Rolex Learning Center relate to its location – to the geography and climate of Lausanne?
An access road wraps the site on all four sides, which is surrounded by the existing campus, with the lake to the south. The Rolex Learning Center is open to all sides so people can access the building from any direction. The landscape created inside of the building is in a continuum with the landscape of the campus and the city.

What are your hopes for the future users of your building, and their enjoyment of this extraordinary place?
The building is not traditional, but new, so we hope that the people will use it in a new and original way.

What attracted you to the idea of working on a building devoted to learning about science and engineering as opposed to other uses such as museum, gallery or domestic spaces?
We were excited by the opportunity to think about spaces where people meet, study, and create entirely new sets of knowledge.

About The Ecole Polytechnique Fédérale de Lausanne (EPFL)

EPFL is the research home of the beginning of the modern computer mouse, of the ambitious Blue Brain Project, of the fastest boat in the world (Hydroptère), and of innovative ideas towards sustainable development. Offering tuition at all levels from undergraduate to PhD, it is one of the world's fastest growing campuses. It is currently ranked alongside Cambridge as the top university in Europe in the category of engineering, technology and computer sciences according to the Shanghai Academic Ranking of World Universities (ARWU).

Situated on a single campus overlooking the shores of Lake Geneva at Lausanne, Switzerland, with extraordinary views of the Alps, EPFL accommodates 11,000 people. These include 7,000 students as well as professors, over 2,000 researchers and other faculty members, plus administrative staff and a number of entrepreneurs running small start-up science and technology businesses located on the campus.

ENCOURAGING COLLABORATIONS

The vision of EPFL President Patrick Aebischer "is to build a university where traditional boundaries between faculties are replaced by a spirit of collaborationfor true scientific inspiration almost always comes from unexpected encounters that break down the boundaries between disciplines in a campus that is open and welcoming to the public."

INTERNATIONAL

With 50 per cent of its faculty recruited internationally and 60 per cent of its PhD students coming from abroad, EPFL is one of the most international universities in the world. Its campus is wholly bilingual (French and English) at Masters level, and students and researchers are strongly encouraged to move between institutions and between countries. EPFL is, with ETHZ (Eldgenössische Technische Hochschule Zürich), one of only two Swiss university institutions supported directly by the Swiss federal government.

START-UPS AND SPIN-OFFS

EPFL is active in seeking collaborations, sponsorships, advice and joint ventures between its most talented scientists and leading industries. Nearly twenty start-ups and spin-off companies a year come from technology developed at EPFL. Through its licensing department, it promotes EPFL's most promising inventions. The recent introduction to the market of EPFL professor Michael Graetzle's dye-sensitive solar cells by the British company G24i, recently in the New York Times, is just one example of EPFL's success in transferring technology. The Science Park at EPFL is an independent foundation that offers office and lab space to private companies seeking technological advances and knowledge exchange. Its short-term leases are designed for fast growing start-ups and flexible arrangements with larger corporations. It fosters a dynamic, international entrepreneurial environment in which, for example, routeRANK, a recent Microsoft start-up of the day, is an innovative and ecologically friendly way to plan a journey.

AN EXPANDING CAMPUS

In addition to the Rolex Learning Center, which will become the university's hub, the development of the campus also includes a new 4-star hotel and a new student housing complex. The next stage, announced in 2009, sees the development of Innovation Square, a group of five new buildings constructed through a public-private partnership. Innovation Square will encompass the existing Science Park, created in the 1990s, and will house research centers for large Swiss and multinational companies. The first company to join the new Innovation Square will be Logitech, a long term associate of EPFL and a leading manufacturer of computer devices, such as the mouse, that interface between people and computers.

EPFL's current plans also include an international architectural competition for the development of two further new buildings at the heart of the campus. The first will be a landmark building for engineering sciences, home to the Institute of Bioengineering and the new Center for Neuroprosthetics. The second will be a conference center, a 3,000 seat auditorium and the first European retractable stage. The budget for the new center is over 200 million Swiss francs and includes further plans for student housing. These buildings will form a key link between the new Rolex Learning Center and the existing campus buildings.

Some examples of major research projects at EPFL

EPFL delivers pioneering research in science and technology innovation. The following are just a few examples of important projects promoting advances in fields such as space technology, medicine, sustainability, and the liaison between research and its practical application in the marketplace.

NEUROBIOLOGY

Blue Brain Project **-** Lead by Henry Markram of the Brain and Mind Institute and involving more than a decade of intensive research and modelling, the Blue Brain Project is the first ever attempt to fully reproduce a biologically accurate digital model of a mammal's brain. By 2018 the Blue Brain Project hopes to be able to model a human brain. This will lead to a new level of understanding of brain function and dysfunction, and will give unprecedented insight into the nature of consciousness. It is a project of global significance.

Center of Neuroprostheses **-** Imagine being able to communicate with a deaf child, or giving a seriously disabled person the possibility of a new form of mobility. These are the kinds of dreams and challenges that spurred the creation of this first large-scale Center of Neuroprostheses. The new Center will concentrate on six main themes: vision (retinal implants), hearing (cochlear implants), mobility (cortical and spinal implants), non-invasive man-machine interfaces (piloting at distance, robotics), the micro-and nano-fabrication of implants, and neuronal coding (signal processing, sensors).

SUSTAINABLE DEVELOPMENT

Dye sensitized cells – Invented by EPFL professor Michael Grätzel, the dye sensitive solar cells is a giant step towards a larger usage of photovoltaic energy. This revolutionary technique, inspired by photosynthesis, is inexpensive to produce and has a high efficiency in low-light conditions. These cells are the subject of numerous scientific research projects and are the object of multiple production developments by enterprises who have purchased the licences from EPFL.

The Energy Center –Production, storing and distribution of energy have to be rethought in order to respond to environmental challenges. The Energy Center brings together civil engineers, chemists, or even computer scientists in order to develop energy networks of tomorrow in a unique cross-disciplinary unit. The pioneering Roundtable on Sustainable Biofuels, an international standard for the energy chain of a product, is just one of many remarkable projects at the center.

ADVENTURE AND SCIENCE

Solar Impulse **-** Having conducted a feasibility study in 2003, EPFL acts as official scientific adviser to the team producing an extraordinary solar-powered aeroplane. Solar Impulse HB-SIA is the world's first aeroplane designed to take off and fly, day and night, without fuel. Much lighter than conventional aircraft and flown by a solo pilot, its wings are layered with solar cells to supply energy to the engines. Solar Impulse has plans for its first night flight in the close future.

Hydroptère **-** This 5-tonne sailing boat broke the world speed sailing record in 2009. The scientific research applied by teams at EPFL to Alain Thébault's boat has implications far beyond sailing. The development of new computer modelling systems for measuring the behaviour of the sails and the foils of the boat at high speed suggests important new applications in other branches of science and technology.

BIOGRAPHIES

Patrick Aebischer, President,

Patrick Aebischer, the fourth president in forty years of EPFL has significantly opened the school's international horizons since he took office in office in 2000. A medical doctor, his current research focuses on the development of cell and gene transfer approaches for the treatment of neurodegenerative diseases. Patrick Aebischer is a fellow of the American Institute for Medical and Biological Engineering and a fellow of the Swiss Academy of Medicine. He is a founder of two biotechnology companies: CytoTherapeutics (now known as Stem Cell Inc) and Modex Therapeutics (IsoTis).

1980	Federal Diploma in Medicine, University of Geneva, Switzerland
1983	Doctorate in Neuroscience, University of Geneva, Switzerland
1983-1984	Research Fellow, Dialysis Center, University Hospital, Lausanne, Switzerland
1984-1986	Research Fellow, Artificial Organs Laboratory, Brown University, Providence,RI, USA
1986-1990	Assistant Professor of Medical Science, Brown University, Providence, RI, USA
1990-1992	Associate Professor of Medical Science, Brown University, Providence, RI, USA
1992-2000	Professor of Surgery and Medical Director of the Surgical Research Division and the Gene Therapy Center, CHUV, Lausanne University Medical School, Switzerland
1995-2000	Adjunct Professor of Material Sciences (Biomaterials), Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland
2000-	Professor of Neurosciences, Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland
2000-	President, Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland

SANAA (Kazuyo Sejima + Ryue Nishizawa)

The acclaimed Japanese architectural practice SANAA (an acronym for 'Sejima and Nishizawa and Associates') was established in 1995 by Kazuyo Sejima and Ryue Nishizawa. SANAA's pioneering buildings have created an architecture that marries aesthetic simplicity with technical complexity. SANAA's most recent major project is the New Museum of Contemporary Art in New York. In 2009 they designed the Serpentine Gallery Summer Pavilion in London. Other notable projects include the 21st Century Museum of Contemporary Art Kanazawa in Japan, and the Louvre-Lens in France. They are the recent laureates of the 2010 Pritzker Architecture Prize, the most prestigious award in architecture.

Kazuyo Sejima

1956	Born in Ibaraki Prefecture
1981	Graduated from Japan Women's University with Masters Degree in Architecture Joined Toyo Ito & Associates
1987	Established Kazuyo Sejima & Associates
1995	Established SANAA with Ryue Nishizawa
2001-	Professor at Keio University
2005-2006	Visiting Professor at Ecole Polytechnique Fédérale de Lausanne
2005-2008	Visiting Professor at Princeton University
2009	Announced as Curator of the 12th Venice Architecture Biennale 2010

Ryue Nishizawa

1966	Born in Tokyo Prefecture
1990	Graduated from Yokohama National University with Masters Degree in Architecture Joined Kazuyo Sejima & Associates
1995	Established SANAA with Kazuyo Sejima
1997	Established Office of Ryue Nishizawa
2001-	Associate Professor at Yokohama National University
2005-2006	Visiting Professor at Ecole Polytechnique Federale de Lausanne
2005-2008	Visiting Professor at Princeton University
2007	Visiting Professor at GSD

Major works by SANAA

1996	Multimedia Workshop, Gifu, Japan
	S-House, Okayama, Japan
1997	N-Museum, Wakayama, Japan
	M-House, Tokyo, Japan
	K-Building, Ibaraki, Japan
1998	Koga Park Café, Ibaraki, Japan
1999	O-Museum, Nagano, Japan
2000	Day Care Center, Kanagawa, Japan
	La Biennale di Venezia, 7th International Architecture Exhibition *City of girls*, Japanese Pavilion, Venice, Italy
	PRADA Beauty Prototype
2001	PRADA Beauty LEEGARDEN Hong Kong, Hong Kong, China
	Garden Cafe at the 7th International Istanbul Biennale, Istanbul, Turkey
2003	ISSEY MIYAKE by NAOKI TAKIZAWA, Tokyo, Japan
	Christian Dior Building Omotesando, Tokyo, Japan
2004	21st Century Museum of Contemporary Art Kanazawa, Kanazawa Japan
2006	Zollverein School of management and design, Essen, Germany
	The Toledo Museum of Art Glass Pavilion, Toledo, Ohio, USA
	Novartis Campus WSJ-158 Office Building, Basel, Switzerland
	Naoshima Ferrey Terminal, Kagawa, Japan
2007	Stadstheater Almere 'De Kunstlinie', Almere, the Netherlands
	New Museum of Contemporary Art, New York, USA
2009	Derek Lam NY, shop interior, USA
	Serpentine Pavilion, London, England

Current Projects

Extension of the Institut Valencià d'Art Modern, Valencia, Spain

House for China International Practical Exhibition of Architecture, Nanjing, China
Rolex Learning Center, EPFL (Ecole Polytechnique Federale de Lausanne), Switzerland
Louvre-Lens, France
Vitra Factory Building, Weil am Rhein, Germany
Flower House, North Europe
Social Housing in Paris XVI District, Paris, France
Multifunctional Building of the Serralves Foundation, Porto, Portugal
Neruda Tower, Guadalajara, Mexico

Funding

A PARTNERSHIP BETWEEN GOVERNMENT AND BUSINESS

The total cost of the Rolex Learning Center is 110 million Swiss Francs. The project has been financed by the Swiss government and major Swiss businesses. Rolex's participation in the project is the fruit of a long-standing relationship with EPFL in research into materials science and microtechnology for watch design. Logitech made the initial contribution that launched the architectural competition. Losinger, member of Bouygues Construction Group and sponsor, was the principle contractor for the building. Credit Suisse has a Future Banking Laboratory in the building. Further internationally active Swiss partners who contributed to the finance, research, and innovation of the building are Nestlé, Novartis, and SICPA.

ROLEX

The leading name in luxury wristwatches, Rolex has been the pre-eminent symbol of performance and prestige for over a century. Headquartered in Geneva, with 26 affiliates worldwide and 4,000 watchmakers in over 100 countries, Rolex continues to build on its time-honoured tradition of achievement and innovation. EPFL's relationship with Rolex is significant. At the end of 2009, 84 EPFL graduates were working for Rolex, employed in research and development, production and information technology. Rolex also commissions research from EPFL in microtechnology and materials science. Rolex's participation as a major sponsor of EPFL's vision to develop its campus through the creation of the Rolex Learning Center reflects its deep-rooted tradition of philanthropy in the arts, science and culture, which also includes such projects as the Rolex Awards for Enterprise and the Rolex Mentor and Protégé Arts Initiative.

LOGITECH

Logitech is a world leader in personal peripherals, driving innovation in PC navigation, Internet communications, digital music, home-entertainment control, gaming and wireless devices. Founded in 1981, Logitech International is a Swiss public company listed on the SIX Swiss Exchange (LOGN) and on the Nasdaq Global Select Market (LOGI). In fiscal year 2009, (ended March 31, 2009), sales were at US$ 22 billion, while operating income reached US$ 110 million.Logitech's R&D centers located in Switzerland and the US, as well as the company's ability to identify consumers and technology trends are key drivers of the group's success, and position Logitech well to pursue its vision of the 'digital home'.

BOUYGUES CONSTRUCTION

Bouygues Construction is a global leader with top-ranking positions in the building, civil works and electrical contracting/maintenance markets. It combines the power of a large group with the responsiveness of a network of local companies which deliver innovative solutions for the financing, design, construction, operation and maintenance of buildings and infrastructure. Bouygues Construction employs 53,700 people in 60 countries and generated sales of 9.5 billion euros in 2008.

For Bouygues Construction, sustainable development offers a tremendous opportunity to move forward and to innovate. Recent years have seen numerous pro-environmental initiatives, and significant progress has been made in conserving the natural habitat, integrating structures into their surroundings, managing resources and recycling waste.

Bouygues Construction is part of the Bouygues group, operating in more than 85 countries, The Bouygues group has a workforce of 145'150. In 2008, its sales totalled €32.7 billion, of which €10.4 billion generated outside France. www.bouygues-construction.com

CREDIT SUISSE AG

Credit Suisse AG is one of the world's leading financial services providers and is part of the Credit Suisse group of companies (referred to here as 'Credit Suisse'). As an integrated bank, Credit Suisse offers clients its combined expertise in the areas of private banking, investment banking and asset management. Credit Suisse provides advisory services, comprehensive solutions and innovative products to companies, institutional clients and high-net-worth private clients globally, as well as to retail clients in Switzerland. Credit Suisse is headquartered in Zurich and operates in over 50 countries worldwide. The group employs approximately 47,400 people. The registered shares (CSGN) of Credit Suisse's parent company, Credit Suisse Group AG, are listed in Switzerland and, in the form of American Depositary Shares (CS), in New York. Further information about Credit Suisse can be found at www.credit-suisse.com.

NESTLÉ

Nestle, whose global headquarters are in Vevey, Switzerland, was founded in 1866 by Henri Nestlé and is today the world's leading Nutrition, Health and Wellness Company. Nestlé employs 283,000 people and operates in nearly every country in the world. In 2008 its sales were CHF 109,9 billion, with a net profit of CHF 18 billion. Nestlé has a global network of 28 R&D Centers, which employ nearly 5,000 people. Nestlé's internal innovation capacity is extended through external partnerships. For example, in November 2006, Nestlé signed a five year agreement with the EPFL to contribute CHF 5 million per year for 5 years for collaborative research on the relationship between nutrition and the brain. www.nestle.com

NOVARTIS

Novartis provides healthcare solutions that address the evolving needs of patients and societies. Focused solely on healthcare, Novartis offers a diversified portfolio to best meet these needs: innovative medicines, cost-saving generic pharmaceuticals, preventive vaccines, diagnostic tools and consumer health products. Novartis is the only company with leading positions in each of these areas. In 2008, the Group's continuing operations achieved net sales of USD 41.5 billion and net income of USD 8.2 billion. Approximately USD 7.2 billion was invested in R&D activities throughout the Group. Headquartered in Basel, Switzerland, Novartis Group companies employ approximately 99,000 full-time-equivalent associates and operate in more than 140 countries around the world. For more information, please visit http://www.novartis.com.

SICPA

Leading global provider of security inks and integrated security systems for governments, central banks, security printers and brand owners, SICPA is the trusted partner in matters of currency, security documents and the protection of government revenues and brand products against illicit trade. Established in 1927, the company has expanded to a multi-national group with headquarters and research centers in Switzerland with offices and manufacturing facilities in 26 locations on five continents. SICPA believes in the power of knowledge and innovations, and its continued success is built on talents coming from a wide range of competencies, notably chemistry, engineering, computer and material science.