Teaching the Laboratory of the Techniques and Preservation of Modern Architecture (TSAM) at the École Polytechnique Fédérale de Lausanne

BY FRANZ GRAF

More than a decade ago the TSAM addressed the question of teaching the preservation of modern and contemporary buildings as a new discipline, specifically and radically different from that of new architecture, both in terms of theoretical courses and the contemporary architecture project. It has established a methodology and a practice based on its research that embrace the whole of polytechnic or university education, whether basic or advanced. Finally, the TSAM affirms the richness and the educational power of preservation and its project, and, beyond the subjective feelings and formalistic emotions, base them on an objective and multidisciplinary argumentation combining fine observation of materiality, essential theoretical knowledge and thoughtful creativity.

Projects dealing with existing buildings and structures are a major issue in the development of the city in the 21st century and the quality of the environment of its users. The preservation project and the project dealing with the existing are part of an established cultural discipline that expands the contemporary architectural project.[1] Projects dealing with the existing built environment are by no means a new phenomenon. But what makes it a contemporary attitude is the type of theoretical and practical questions about the architectural object regardless its scales, as well as the close look at the materiality of the building that gives birth to the project. The Laboratory of the Techniques and Preservation of Modern Architecture (TSAM),[2] founded in 2007, produces and develops knowledge of techniques and the preservation of modern and contemporary architecture. This knowledge is multidisciplinary and calls for historical reflection as well as material techniques and their implementation as economic and environmental data. It also involves the exercise of specific project strategies (maintenance, preservation, restoration, rehabilitation, restructuring, reuse and extension) combining theoretical knowledge and technical know-how. TSAM's main objectives are teaching, research and the development of services related to its skills. This essay will be mainly about teaching.

The "Preservation" orientation, under my direction at the EPFL since 2012, organizes this scientific competence, both at the level of studio teaching as well as lecture courses at the Bachelor's and Master's level as well as Master's projects and PhD work.

Seventy percent of the activities of architectural practices in Switzerland concern projects on existing buildings. The course "Designing in the built [environment]: tools and methods", under the responsibility of Giulia Marino, seeks to give students the basic theoretical and practical tools to undertake projects on existing structures, on the current ubiquitous built heritage but also on that with a monumental character. This course is in the last semester of the Bachelor's degree, hence it should be considered a basic educational course in the teaching of architecture.

Indeed, the project in the existing environment is a very broad discipline that calls for many forms of knowledge, a hybrid scientific rigour and prospective imagination. The cultures of history and those of technology intersect and are layered in a creative process that rests on an investigation of the building and continues throughout the process of conception. This intellectual journey is based on the meticulous knowledge of the built work, its observation and physical analysis, by the intersection of history and technology, and the synthesis of the most diverse skills, both theoretical and operational. The principal objective of the course is to identify this complex process. First of all, it is necessary to explain the cultural reasons and the fields of application of the project of preservation and restoration, in support of some theoretical and legislative concepts, as well as by an introduction to the knowledge of the current tools of inventory and prior definition of the heritage value of buildings. This historical-critical introduction continues by taking into account the methodological issues of the preservation project, from the first phase of knowledge and analysis, to the development of the most appropriate project strategy, then its management and implementation.

Hence the essential tools of the project in existing structures are approached systematically. An understanding of the constructional specifics of the built heritage and their

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Le Corbusier, Unité d'habitation, Marseille, 1945. Analytic model made by Atelier Graf, 2015, Alain, 2015.

evolution — structure, materials, implementation methods, etc. — is the unifying thread of education. On the basis of this thorough material survey, the main themes of the project in existing buildings are subject to a targeted review. This deals in particular with the extended diagnosis of the state of preservation, including the level of structural disorders, the various techniques of intervention — preservation, repair, consolidation, etc. — passing through the crucial question of upgrading buildings, as well as their adaptation in terms of use, safety, comfort, etc.

Due to the very nature of the largely multidisciplinary preservation project, synergies with other subject courses are envisaged — building physics, the survey and figurative techniques, structure and materials, etc. In the same way, specific contributions are organized from EPFL courses conveying specific skills in physical-chemical phenomena and the behavior of buildings.

The Master's course on "Theories and Techniques of the preservation project", held by Franz Graf and Giulia Marino, serves a twofold purpose. The first is to trace the development of the construction systems that marked the architecture of the 20th century, by addressing key concepts such as new materials, transformations of the modern building site by the introduction of industrialized processes, or the devices for the artificial control of comfort. This multidisciplinary knowledge calls for historical reflection and an understanding of the techniques of materials and their installation, as well as economic and environmental data. The critical history and the material analysis of building in the 20th century, by its constructional specificity, requires us to develop specially devised preservation strategies, studied with a specific know-how with reference to an established theoretical competence.

The second objective of the course is the adoption of project tools that take into account the challenges of our modern heritage. By studying events that have proved particularly formative for the discipline, the course deals with the theoretical and practical foundations of the project in existing buildings — from the monumental heritage to the most ordinary architecture — as well as techniques of restoration and conservation of buildings.

The concepts of the history of the theories of preservation that developed in the 19th and 20th centuries are addressed all through the semester, not only to explore the foundations of the discipline, but also to stimulate students to adopt a critical and coherent attitude to the project in existing buildings.

The content of the course is wholly based on research conducted in the TSAM laboratory by Franz Graf and Giulia Marino as well as into restoration of the monumental heritage of the 20th century,[3] comparisons between the heritage and energy issues on the large scale of the years 1945–1975[4] or on the buildings of the International Organzations in Geneva.[5]

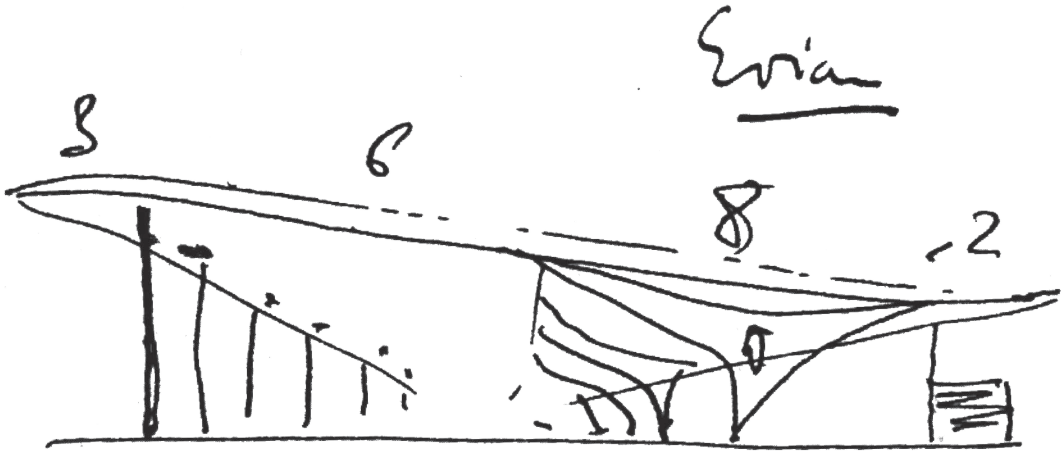
The Master's course in "The project of comfort in 20th century architecture", under the responsibility of Giulia Marino, seeks to restore the centrality of the networks of utilities, identifying both the cultural reasons and the material issues of the "project of comfort" within the "architectural project". The course lies at the crossroads of the disciplines of construction, history and preservation. Its content is the outcome of the notable thesis work by the lecturer.[6] The notion of physiological-hygrothermal comfort, as well as lighting and acoustic well-being, is to be noted among the major imperatives of the architectural production of the 20th century and is still strikingly timely.

Innovative materials and techniques, but also unprecedented industrial systems and processes: while the 20th century's "constructional revolution" is widely recognized in the history of architecture, the equipment to ensure comfort, which is fully a part of it, remains a subject often overlooked, not to say simply ignored. And yet… Skilfully coloured sheathes that participate in the expression of "brutalist" interiors… Hot water pipes incorporated in the thickness of the floor supporting open-plan layouts… Heaters and radiators that are transfigured into partitions or then disappear into the interstices of the envelopes… Concealed, incorporated, or later exposed, even literally displayed, these networks of heating, ventilation and air conditioning, which are paradoxically bulky yet often invisible, deserve new consideration as truly structuring elements, not — and quite wrongly — as mere fitted or accessory components.

The hypotheses of the pioneers — from James Marston Fitch (1909–2000) to Reyner Banham (1922–1988) — remain strikingly relevant. To grasp the implications of the "climate project" within the "architectural project", through a transversal reading located at the crossroads of the perceptible and the material, opens up extremely significant interpretational approaches to modern and contemporary architecture. Structured around a few founding themes of this major production — from the industrialization of building to the notions of lightness and transparency — this panorama also makes it possible to identify the cultural reasons for "climate design" and artificial control of the interior environment, a practice that runs all through the 20th century and influences very directly both architectural design and its material implementation, these two factors being inseparable.

The new paradigms of energy saving demonstrate the timeliness of the notion of material well-being in its new meaning of "total comfort". They will be treated in relation to the crucial question of the adaptation of the existing building to current standards by targeted interventions in the technical installations.

With respect to the teaching of the three sections of the Faculty of the Natural, Architectural and Constructed Environment (ENAC) of the EPFL, namely Architecture, Civil Engineering and Environmental Sciences, the seminar "Strategies and techniques for reuse of 20th century architecture", under the responsibility of Franz Graf and Giulia Marino, calls for specific themes and know-how, entailing an interdisciplinary approach that touches on the different areas that characterize the faculty. This project intends to develop these themes with reference to the specifics of each field, the environmental impact of a reconversion project



01 Maurice Novarina, Jean Prouvé, Serge Ketoff, Buvette d'Evian, 1954, sketch by Jean Prouvé, Archives départementales de Haute-Savoie.

and the structural diagnosis of a building, including the definition of its heritage value. Each student develops a problem related to his or her academic skills and scientific interests, chosen from a list drawn up by the lecturers or proposed personally by the student. The research topics — with reference to the specifics of 20th century buildings — will concern, for example, the pathologies of a building material or its use and the measures for its repair/preservation (reinforced concrete, light alloys, plastics, etc.), the detection of the presence of toxic materials in a building (asbestos, PCB, radon, etc.), and the procedures for sanitising and managing waste on the construction site, or architectural analysis – constructional and spatial – of an object with a view to defining the possibilities of reconversion, etc.

The laboratory organizes "international study days" that link its research activity and its application to its teaching for students at the TSAM as well as for EPFL students. They include "Industrialized and Prefabricated Architecture: knowledge and preservation" in June 2011, "Comfort devices in 20th-century architecture: knowledge and preservation strategies" in September 2012, "The restoration of major engineering works of the 20th century" in May 2013, and "Restoring technical structures — the work of Jean Prouvé" in September 2018. All of them are the subject of important publications in this field.[7]

With the same purpose, and in collaboration with **docomomo** Switzerland, the laboratory offers lecture series, such as "Project, history and construction. A new look at the recent heritage"[8] with outstanding guest architects, historians, theorists and practitioners, such as Ana Tostões, Françoise Lacaton and Frédéric Druot, Martin Boesch, François Botton, Laurent Stalder, Paul Chemetov, Frank Escher and Ravi GuneWardena, Gilles Ragot, Eduardo Prieto, Richard Klein, Jurg Conzett, Joseph Abram...

The workshop on "Theory and criticism of the project" in the third year teaches the project of preservation of modern and contemporary architecture. It is under the responsibility of Franz Graf and the teaching team is made up of Yvan Delemontey and Theo Bellmann. Giulia Marino, Stefan Rutishauser, Christian Bischoff and Michael Wyss have also taken part in it. This specific discipline calls for a series of rational and technical investigations that will both produce knowledge about the object of study and define potential uses and methods of intervention. Inseparable from the project, the fullest possible documentation of the work is established by using historical research and graphic and photographic surveys, from its constructional process and its materiality to its sensory and sensuous aspects. Its heritage value is determined by situating the structure in its historical, architectural and urban context, in the work of the actors who designed and built it, and an economic and social resource. The analysis of its functional and distribution capabilities, its constitution and physical characteristics dictate its potential for use, from maintenance to restructuring.

Hence the preservation project is defined as a twofold and inseparable project of conservation and innovation.

In organizational terms, the studio's work is divided into two fundamental phases which correspond to the intermediate and final critiques: "Survey, Diagnosis and Repair" and "Project of Intervention". The first concerns the survey and diagnosis of the works on site. The initial weeks of the semester are devoted to an exhaustive knowledge of the subject of the workshop. The observations made during the on-site visits and in the verification and the finalization phase of the survey are the subject of consultations with the EPFL experts selected by the students. At the end of this first phase, the program of the intervention project (renovation, rehabilitation, extension, etc.) is unveiled to the students. The work, until this point collective, develops into individual projects. Issues raised during the phase of the objects' comprehension need to find a coherent and appropriate response in the preservation project. Organized successively, these two stages are inseparable from each other, with the knowledge accumulated during the survey of the existing inevitably nurturing the project of renewal. Lectures on themes inherent in the work of the studio are planned throughout the semester and seek to provide

02 Marco Zanuso, Fabrica Olivetti Argentina, 1956, perspective view, from *La progettazione integrata per l'edilizia industrializzata*, ITEC, Torino, 1977.

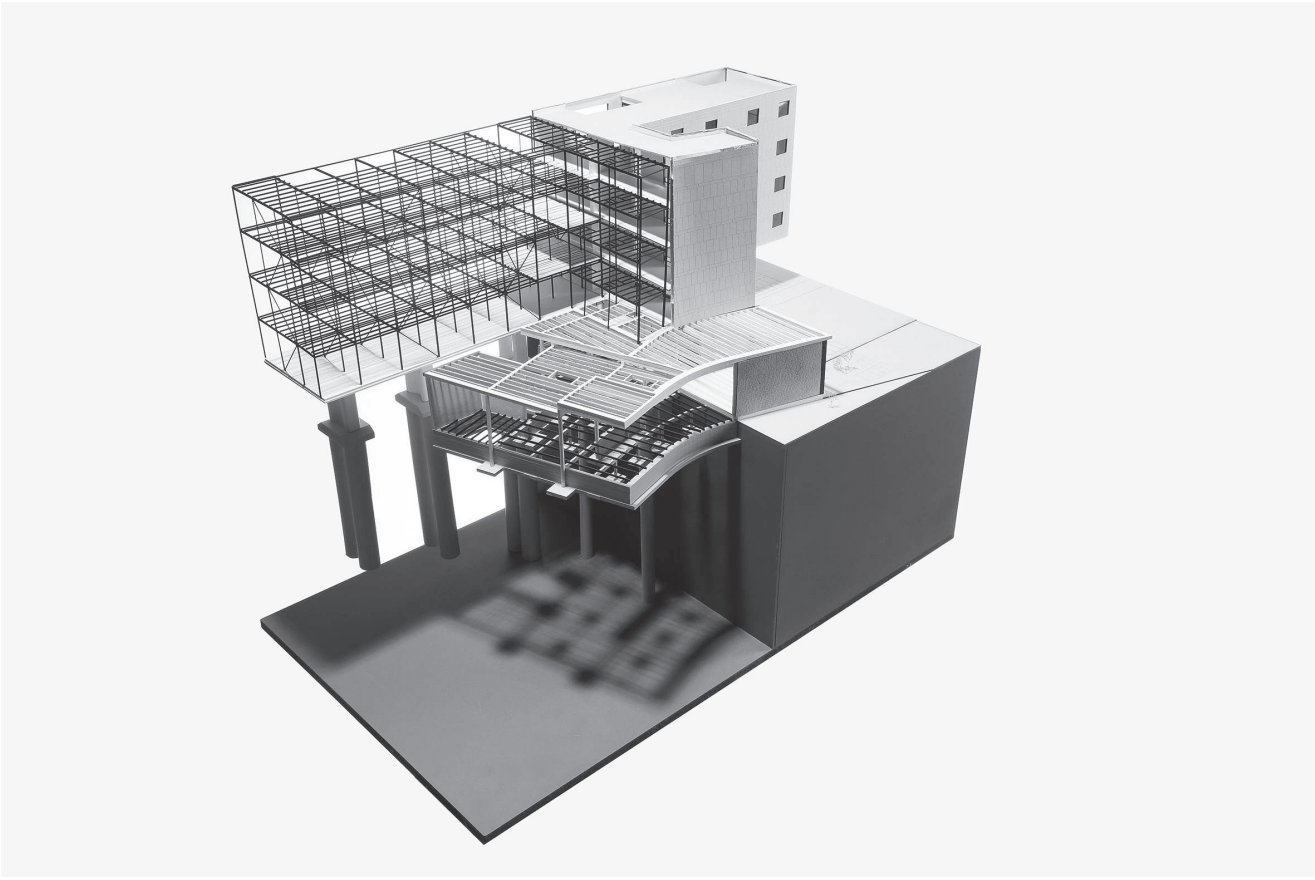
students with theoretical contributions of the highest order. In the same way, field trips are organized in order to study architecture and architects in direct contact with the current issues of intervention in the existing. These phases of the work always prove to be very rich for the students and are, therefore, essential to their formation.

The studio intends to convey to students the theoretical and practical elements of of this project discipline's development, this "knowledge in action". The object or complex of study and the subject of the project will be a part of the city and the region in the post-war period, and it is a heritage of recognized quality, either monumental or widespread. In this way the studio project has dealt with industrial objects to be reclaimed, like the Aïre water treatment plant in Geneva by Georges Brera in the academic year 2007–2008; Olivetti's Ivrea power station by Eduardo Vittoria in 2008–2009 or the headquarters of the main roads department at Vernets by François Maurice in 2009–2010; university and research centers such as CERN in Geneva by Rudolf and Peter Steiger in 2010–2011, the campus of the École Polytechnique Fédérale in Lausanne in 2011–2012 or the Federal Agricultural Research Station in Changins by Heidi and Peter Wenger in 2019–2020; abandoned masterpieces such as the Palazzo del Lavoro in Turin by Pier-Luigi Nervi in 2012–2013 or the Franziskushaus convent at Dulliken by Otto Glaus in 2018–2019. From 2012 to 2018, in collaboration with the Le Corbusier Foundation, the workshop focused its attention on his work, and the projects concerned the Frugès housing estate at Pessac, the Swiss and the Brazilian Pavilion at the *Cité Universitaire de Paris*, the Cabanon at Roquebrune Cap-Martin, the Claude and Duval Factory, the *Unités d'habitation* (Marseille, Rezé, Briey-en-Forêt, Berlin, Firminy), the *Chapel Notre-Dame du Haut* in Ronchamp and the *Maison de l'Homme* in Zurich. This has made it possible to create an unprecedented body of knowledge about the materiality of the work and its restitution in the form of models and analytical axonometric projections, to participate in the questions that arise about all these great buildings and to follow the restoration and work in progress closely.

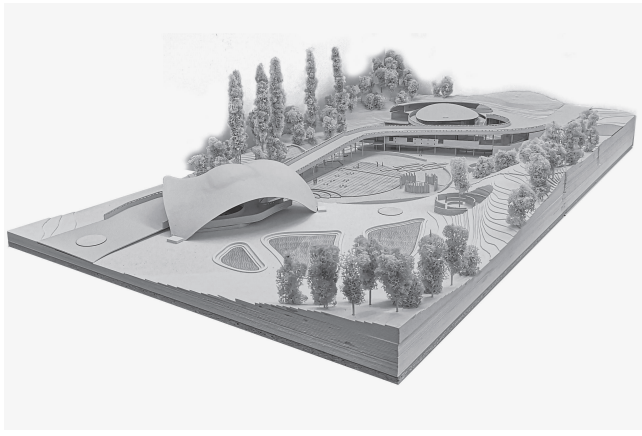
In the Master's course, the studio in "Preservation Orientation" deals with the methodological foundations of the discipline: a significant choice in relation to the physical and material state of the object, its potential in the development of the project, a knowledge of it through the survey, in-depth historical investigation, analysis of an imminent problem or implementation of a preventive action, development of possible intervention strategies while retaining the spatial, material, distributional and even poetic qualities of the object. It is expected that, unlike the third-year workshop, the object — and its issues — could be on a different scale, dealing with the landscape, industrial or railway wastelands, urban or rural mountain complexes, etc. It may also be open to another historical period than the second half of the 20th century and/or bring the project of the new to a more independent development based on considerations of current production and the use of buildings as a resource. Thus the guest teachers Andreas Vass and Erich Hubmann in 2012–2013 proposed a workshop on the reuse of the unintentional monuments of the flak towers from WWII built around the center of Vienna, and the following year Daniel Bossard and Merixell Vaquer developed a project comparing utopia and the existing built environment, defining the city and, in particular, the Zurich periphery as a desperate attempt to achieve a complete urbanity between a Romantic rurality and endless suburbs. In 2014–2015, the theme of Denis Eliet and Laurent Lehmann's studio was the rehabilitation and reclamation of all the *Grandes Terres* built by Marcel Lods and Jean-Jacques Honegger between 1951 and 1961, while João Pedro Falcão de Campos took as his topic the rehabilitation and extension of schools at *Teixeira de Pascoais* in Lisbon built by Ruy d'Athouguia in 1952–1956 and of one of those in Lancy built by Paul Waltenspuhl in the post-war period.

The teaching of preservation in the Master's courses continued in 2016–2017 under the direction of Frank Escher and Ravi GuneWardena centered on California architecture of the 1950s, including John Lautner's Chemisphere House, the Charles & Ray Eames House and the Bubeshko Apartments by Rudolph Maria Schindler, while in

03 Le Corbusier, Pavillon Suisse de la Cité Universitaire, Paris, 1930. Analytic model made by Atelier Graf, 2017, Alain Herzog, 2017.



04 Le Corbusier, Chapelle Notre Dame du Haut, Ronchamp, 1950. Analytic model made by Atelier Graf, 2016, Alain Herzog, 2016.



05 Michel Magnin, Jardin d'enfants Nestlé à la Vallée de la Jeunesse, Lausanne, 1964, picture of model from the diploma project for the restoration, Darine Dandan et Anouar M'himdat, 2019.

2017–2018, Anne Lacaton and Frédéric Druot dealt with the fabric in rapid development around the Renens train station to demonstrate that use, reuse and transformation are today a part of creation and invention in architecture and urbanism. In 2018–2019, the Linazasoro studio perfectly conducted a highly conclusive teaching experiment, in the first semester on the reclamation of the poblado de Fuencarral in Madrid (1956–1960), confronting without *pathos*, but with all the means proper to the discipline, the decay of our diffuse urban environment, and in the second on the recovery of a major project by Hans Döllgast on the Alte Basilika Sankt Bonif in Munich after WWII. This was radically tackled in the project and made it possible to understand its complexity and refinement, offering a new reading of various projects and stratifications and new materials to the few architects still concerned with a largely unrecognised work. In the year 2019–2020, two architects from Grisons, Ramun Capaul and Gordian Blumenthal, will focus on the village of Lumbrein to understand the evolution of an alpine village and its architecture as well as its potential for reasoned development.

In this way, year after year, the contributions of the most experienced European and Californian architects and teachers in the field enrich what we can now consider as a large-scale think tank on Preservation and its interpretations.

The TSAM laboratory supervises the diploma work, named the "Master Project" at the EPFL, for a total of 66 students since its establishment. Developed over two semesters, the first concerning a theoretical statement and the second a project, they fit strictly into the issues of Preservation in the broad sense of exploring the themes and places of change. As an example, last July, one of them proposed the restoration of the sculptural Brazilian Nestlé kindergarten built by Michel Magnin at Vallée de la Jeunesse in Lausanne for Expo 64 and today derelict. Another developed a plan for the densification and transformation of the Marta Brunet district on the outskirts of Santiago de Chile, both of which have received the highest appreciation for the quality of the work done.

The TSAM also supervises thesis work. This year it supervised theses on "*The vestiges of Operation Million in the work of Georges Candilis*" and "*Modern schools in Angola, 1961-1975. Design with climate and heritage*" in co-supervision with the IST-Lisbon.

To conclude, we will say that more than a decade ago the TSAM addressed the question of teaching the preservation of modern and contemporary buildings as a new discipline, specifically and radically different from that of new architecture, both in terms of theoretical courses and the contemporary architecture project. It has established a methodology and a practice based on its research that embraces the whole of polytechnic or university education, whether basic or advanced. Finally, the TSAM affirms the richness and the educational power of preservation and its project, and, beyond the subjective feelings and formalistic emotions, base them on an objective and multidisciplinary argumentation combining fine observation of materiality, essential theoretical knowledge and thoughtful creativity.

Notes

1 Franz Graf, *Histoire matérielle du bâti et projet de sauvegarde – Devenir de l'architecture moderne et contemporaine*, Lausanne, PPUR, 2014.
2 https://www.epfl.ch/labs/tsam/.
3 https://www.epfl.ch/labs/tsam/page-28043-fr-html/%20le-patrimoine-monumental-du-xxe-siecle/.
4 https://www.epfl.ch/labs/tsam/page-28043-fr-html/patrimoine-et-energie-la-grande-echelle-1945-75/.
5 https://www.epfl.ch/labs/tsam/page-28043-fr-html/the-buildings-of-the-international-organisations-in-geneva-an-outstanding-heritage/.
6 Giulia Marino, "Some Like It Hot! Le confort physiologique et ses dispositifs dans l'architecture du XXe siècle histoire et devenir d'un enjeu majeur" This work was awarded the EPFL thesis prize 2016.
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8 See conferences **docomomo**-TSAM 2016-2018, www.**docomomo**.ch.

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