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University building in France
Nantes School of Architecture, view of the west façade from Place des Érables.
Making space and leaving space

By Herman Hertzberger

Translated by George Hall
Besides all the technological and physical measures aimed at improving sustainability which are often questionable and difficult for architects to appraise, architecture could make a fundamental contribution to sustainable construction if it were capable of discarding the traditional idea of buildings as static and, above all, finished artworks. The designs should be changeable, extendable, and shrinkable, in short, adaptable to the dynamics of present-day life. Nothing would need to be demolished, because buildings would remain usable for much, much longer.

Wouldn’t it be better to regard our buildings less as completed products and more as works in progress, where each final situation can represent the beginning of a following stage within a permanent situation of becoming? We ought to concentrate on a main spatial theme – the structure – which as a constant potential is not neutral but preserves the basic idea of the design. To put it plainly, our task is to make buildings with a time cycle that is as long as possible, while leaving scope within this cycle for short term insights and interests.

It appears to me that the architectural duo of Anne Lacaton and Jean-Philippe Vassal belongs to the generation that has experienced this inevitable paradigm shift in architecture. The School of Architecture in Nantes, designed by Lacaton & Vassal, 2009, is a curious example of a building that generously lays itself open to unpredictable spatial demands. The complex, which at first sight looks like a kind of renovated factory with a semi-transparent façade, has enclosed sections within it that are defined by a separate double-glazed enclosure. Thanks to their extra thermal insulation, these secondary structures within the building comply with the high climatological standards that we believe should be applied to all buildings at all times, but which are actually only necessary and useful in conditions
of extreme heat or cold – in other words, for a few months of the year at most. Conceptually, the design resembles tents that have an inner as well as an outer tent, and, therefore, cover a substantially larger area. It means that for most of the year, you have ample space at your disposal in which temporary or permanent expansions can potentially be added. That the necessary funding can be raised to create a building like this that “allows for growth” is a miracle, and as an example of sustainable construction, the school is a surprising development that also fits entirely into the “French tech” tradition, articulated by Baudoin & Lods’ School at Suresnes, the deux chevaux, Jean Prouvé, and Jean Nouvel.

The architectonic elaboration of the Nantes School of Architecture is such that interventions by new users will add to and not subtract from the image that the building radiates inwardly and outwardly. Instead of the remoteness of the traditional architectonic ideal, emphasis is placed on the message of appropriation that architecture can and should evoke. In structural terms, the architect determines the code through which the message is conveyed, but the message itself no longer belongs to his working domain. We must devote our efforts to an architecture that, as a data carrier, can accommodate additions, transformations and periodic alterations.

A new sustainable construction project, like the school, calls for a different design strategy in order to be realized within a given budget, which our
present-day building culture calculates down to the last decimal. Changeability demands margins, in height and in surface area and, of course, in the load-bearing strength of the construction. Genuine sustainability requires extra investment by definition, not only in monetary value to offset installation and construction costs, but also in the provision of space, its programming and management, and, ultimately, in the education of architects. By sourcing industrial building products and processes, Lacaton & Vassal seem to have provided architecture with an innovative model by which architects can finance this sustainable investment.

Designing is not about whether a space is determined by the signification attached to it. The core of the matter is rather whether or not the design, when stripped of a particular signification and placed in new circumstances, can be resignified and if so, to what extent? We not only have to give space to things, but we have to ensure that these spaces can sustain their existence even when their signification changes.

What we call space is, on the one hand, the shaky equilibrium of the signifiable, as yet unsigned and is, in that sense, virginal; but, on the other, it resolutely invites this treatment and is thus, in effect, predisposed and predestined. There is a tug-of-war between architecture’s potential for signification and the use of that potential: I call that making space and leaving space.
“Target issues” for sustainable construction

- Innovation and transferability
- Environmental quality and resource efficiency
- Ethical standards and social equity
- Economic performance and compatibility
- Contextual and aesthetic impact
Sustainable development and architecture are multifarious subjects intertwined with many other complex issues. To make sustainable construction easier to understand, assess, and practice, the Holcim Foundation for Sustainable Construction and its renowned partner universities* developed a five-point definition. These five so-called “target issues” serve to measure the degree to which buildings or infrastructure contribute to sustainable development.

Three of the five “target issues” align with the primary goals of the Rio Agenda: balanced environmental, social, and economic performance. A further target issue applies specifically to building – the creation of appropriate buildings, neighborhoods, towns, and cities. The final target issue recognizes the need for significant advancements that can be applied on a broad scale.

These five “target issues” are explained in detail and illustrated at www.holcimfoundation.org/target. The pages that follow summarize the five criteria and how the new Nantes School of Architecture meets them.

* see details at: www.holcimfoundation.org/univ
Innovation and transferability
The project must demonstrate innovation at the forefront of sustainable construction. Breakthroughs and trend-setting approaches, irrespective of scale, must be transferable to a range of other applications.

The Nantes School of Architecture represents a fundamentally different way of conceptualizing low-cost architecture, in which a minimal budget translates into maximum space.

By optimizing construction processes for the production of extra space, Lacaton & Vassal Architects more than doubled the project’s usable surface area, from 12,500 to 26,000 square meters.

The embedded potential of these additional, non-programmed spaces engenders new dynamics both within the school and between the school and its immediate context.

The Nantes School of Architecture is the first program to be installed in the space; the scheme’s anticipation of change suggests that what is now a school could easily adapt to an altogether different use.

As an architecture school, the building will make a long-lasting and influential impression on future generations of architects, who will go on to broadcast its sustainable values both nationally and internationally.
Environmental quality and resource efficiency
The project must exhibit a sensible use and management of natural resources throughout its life cycle, including operation and maintenance. Long-term environmental concerns, whether pertaining to flows of material or energy, should be an integral part of the built structure.

Natural climatic controls, such as passive cooling and cross-ventilation, are integrated into the design to such a degree that the building can do without mechanical cooling systems.

The façade’s polycarbonate panels capture solar heat gain and minimize heat loss between the interior, programmed spaces and the exterior.

A rack and rail mechanism controls 50% of the polycarbonate façade. The façade’s operability allows the user to manually regulate the building’s interior climate.

The combination of both a robust and a lightweight structure is central to the building’s ability to respond to changes in program, thus decreasing the probability of future grey energy.

The Nantes School of Architecture achieves relatively dense land use. Given that the Île de Nantes is located in the city center, the project’s choice of site consolidates the city’s urban development as opposed to development in its periphery.
Ethical standards and social equity
The project must adhere to the highest ethical standards and support social equity at all stages of construction, from planning and building processes to long-term impact on the fabric of that community. The project has to provide an advanced response in terms of ethical and social responsibility.

Because of the project’s collaborative nature, the new school of architecture is able to respond to both local and national concerns as a building, a public amenity, and an urban extension.

Positioned as maître d’usage, the school, with its students, faculty, and staff, played a central role in conceptualizing the new school of architecture and were able to shape the spaces they needed.

The material treatment of the ground floor as a continuation of the asphalt street dissolves the threshold between the institution and the city, entrenching it into the urban fabric.

Completely accessible to the general public, the Nantes School of Architecture is a truly public space. The general public enjoys the unrestricted use of the exterior ramp, outdoor terraces, and the panoramic rooftop.

The building’s non-programmed spaces and structural flexibility prompts its users to engage with it as productive and creative users of space.
Economic performance and compatibility
The project must prove to be economically feasible and innovative as far as the deployment of financial resources is concerned. Funding must promote an economy of means and be compatible with the demands and constraints encountered throughout the construction’s life span.

The minimization of costs as a strategic asset to maximize space provides an innovative model for architectural financing.

The use of industrial construction processes and prefabricated building systems dramatically reduced construction costs and increased the building’s structural strength. With a load-bearing capacity of 2.5 times the standard, the main structure can accommodate virtually any future programmatic use.

Natural forms of climatic control eliminate any costs associated with the installation and operation of mechanical systems.

As an educational institution, the building attracts over 1,000 students, faculty, and staff to Île de Nantes. This influx of a younger creative generation acts as a catalyst to the city center’s economic and cultural development.

The school welcomes the public to appropriate its spaces and to make use of its public services and amenities, such as its ongoing lecture series, library, exhibition spaces, art installations, terraces, and panoramic rooftop.
Contextual and aesthetic impact
The project must convey a high standard of architectural quality in the way it addresses cultural and physical factors. With space and form of utmost significance, the construction must have a lasting aesthetic impact on its surrounding environment.

The building’s industrial character firmly embeds the school in its urban context, formerly dominated by industrial warehouses and transport infrastructures.

The sheen of corrugated metal and translucency of polycarbonate panelling adorns the school’s raw and bare aesthetic and modulates its interior lighting.

The school’s perceptual periphery is blurred by the polycarbonate façade. The façade’s extension to the boundary of the site suggests that the school is not restricted to the site that it stands on, but includes all the spaces and views surrounding it.

The building provides the city center of Nantes with culturally valuable indoor and outdoor spaces. In particular, the panoramic rooftop serves as a unique location to host large-scale cultural events.

Generosity of space is a fundamental design principle espoused by the architects, providing its users with comfortable, adaptable, and multi-functional spaces.
Lacaton & Vassal Architects: Sustainable space makers

By Nathalie Janson

Nathalie Janson was born in Stockholm, Sweden, and received an M.A. in Art History and International Relations from the University of St. Andrews, Scotland. Her work has appeared in Volume, the New City Reader, and at the Venice Architecture Biennale. She currently lives in Berlin.
The work of Lacaton & Vassal is exemplary of the multifaceted and innovative potential of contemporary sustainable architecture. The application of intelligent agricultural building systems and materials has dramatically reduced energy use across their entire body of work, regardless of scale or location. Combined with their use of natural climatic controls, such as passive cooling, natural ventilation, and solar heat gain, their approach to architecture is paradigmatic of sustainable principles. Yet what makes the work of Lacaton & Vassal particularly exciting is its ability to create extra space at no additional cost, which re-introduces the question of space into the discourse of sustainability.

For the architects, this sustainable approach to energy use and resource efficiency is useful insofar as it significantly improves current living conditions. “Sustainability means improving the quality of life while acting responsibly towards one’s environment,” Anne Lacaton explains, adding that “comfort, in terms of specifications, is merely rules and figures, whereas in reality its firstly a sensation after all.”¹ In light of this, Lacaton & Vassal’s application of agricultural building systems serves as a means to an end, which is almost always the production of generous spaces. Commerce requires the efficiency of both space and performance, which has led to architectural advances in non-architectural industries. The surplus value that Lacaton & Vassal generate through the appropriation of these building systems is reinvested into the creation of surplus space, thereby extending the project’s original budget to create even more space than required.

meters of terraces, plus another 5,500 of unprogrammed interior spaces. In earlier rural-suburban projects, the creation of extra spaces responded to the traditional house being neither gracious nor spacious enough; with the shift from the rural to the urban, these additional spaces take full advantage of high land values and provide the users with a comfortable and flexible space in a dense urban location. Designed as an open-ended and multi-functional structure, the school of architecture consists of three concrete floor plates, which are made accessible by a continuous ramp that starts at the ground floor and continues to the rooftop. The seven-meter high ceilings between the floor plates are subdivided by a lightweight steel structure that supports intermediary floor levels. The building’s polycarbonate façade is pushed to the site’s boundary, taking full advantage of the available surface area and blurring the visual boundary between the school and its immediate urban context.

Paradoxically, it is precisely this primal move to create excess space that makes the building ecologically, socially, and financially sustainable. The building’s double-height unprogrammed volumes, designed at the architect’s discretion, provide the school with adaptable and multifunctional spaces that will allow the building to be repurposed rather than destroyed and built anew. Flanking both sides of the programmed, interior spaces and clad in polycarbonate panels, these volumes retain solar heat during the winter and act as passive cooling mechanisms during the summer. Since this effectively eliminates the need for mechanical cooling systems, the rooftop is liberated from utility ducts, creating even more usable surface area. With an industrial load-bearing capacity, the rooftop is able to host large-scale events, engendering new cultural and financial dynamics between the school and the revitalizing city center.
The way in which these additional spaces contribute to the building’s sustainable mechanics demonstrates that there is no straightforward correlation between a project’s surface area and its sustainability. In the past, the creation of extra spaces might have increased operational, programming, and energy costs, a burden disproportionately placed on the future proprietors and users of the building. By considering the building’s entire lifespan – its maintenance, repair, and socio-economic dynamics – from the beginning, Lacaton & Vassal collapse the sequential nature of the building process, which is often to blame for inefficient construction methods and high maintenance costs. The implosion of the building’s past, present, and future has the added effect of programming the structure for future uses, reducing the probability of demolition and rebuilding, thus amplifying waste reduction. More fundamentally, this temporal dissolution reflects a reorganization of architecture’s priorities, which often focus exclusively on its image to the detriment of its uses.

The re-introduction of space to the discourse of sustainability suggests that spreadsheets, equations, and numbers are beginning to give way to a more holistic understanding of the social and environmental life of a building. Sustainability sets tasks, objectives, and goals; the responsibility of the architect is to appropriate these challenges as a means to produce spaces that contribute substantially to the building’s quality of life. The most important lesson to be learned from the Nantes School of Architecture is that the quantifiable successes of sustainable architecture only gain true relevance when they tap into the human condition that is at the heart of both sustainability and architecture. It serves as a prime example of how an active building grows with time and scale until it eventually extends into the city, contributing to our urban environment as a building, a university, and a public amenity.
The old school
During the 1990s, it became clear that the original school of architecture, built in 1972, had become obsolete and too remote. With small studio spaces, crammed mezzanines, and an inconvenient circulation system, adaptations to the school’s academic program became increasingly difficult to accommodate. As a temporary solution, new programs were installed in trailers placed in an adjacent park, undercutting the school’s unified identity and energy. Located on the outskirts of Nantes, the school was also poorly connected to the city, which inadequately reflected the school’s pedagogical intention to broadcast architectural culture in the public (and urban) domain. With increasing pressure from the students and teachers, the administration decided against renovating their existing building in favor of constructing a new school. In the spring of 2002, the Nantes School of Architecture launched the official competition.

Île de Nantes
Located in the Northwest region of France, Nantes developed into the nation’s sixth largest city as an industrial port in the 19th century thanks to its proximity to the Atlantic Ocean and the River Loire. The site chosen for the school is located on the Île de Nantes. Right in the city center, this island measures 337 hectares, making it considerably larger than the historical city center of Nantes. Formerly the site of the city’s port, the area remained mostly unused since the relocation of naval commerce to Saint-Nazaire in the 1970s, as development proceeded in the city’s periphery. Because of its central location, city officials identified Île de Nantes as a prime location for urban development and launched a major redevelopment scheme in 2001. Inspired by the rejuvenation of former European
port cities like London and Barcelona, the Île de Nantes was rezoned as a mixed-use neighborhood, sparking the development of residential and office buildings, as well as public spaces and civic amenities.

**Competition brief**

Three possible scenarios for the school were considered during the development of the brief. At the smallest scale, a surface area of 10,000 square meters would provide the minimum amount of space needed to accommodate the school’s program. At an intermediary scale, these spaces could become more generous and flexible. And at the largest scale of about 14,000 square meters, the school could be further developed to provide meaningful public spaces. With the Nantes School of Architecture spearheading the project as *maître d’usage* (patron user), the brief reflected the wishes and hopes that the students and faculty had for the new school at the intermediary scale of 12,500 square meters.

Lacaton & Vassal’s experience, however, suggested that even the intermediary scale would not be enough to accommodate the school’s program, let alone any additional public use, which they saw as the school’s true potential. With 9,000 square meters allocated for the educational space of 1,000 students, circulation, parking, and administrative spaces had to make do with only 3,500 square meters, leaving no room for future growth. Exercising their architectural judgment, Lacaton & Vassal responded by doubling the project’s surface area from 12,500 to 26,000 square meters. This move positions the production of space as the key principle to the development of the Nantes School of Architecture and provides a framework through which the building can be analyzed on three scales: as a structure, a university complex, and as an extension of the city.
The site

The school’s site measures approximately 5,000 square meters and borders on a picturesque wharf along the Loire. With eight bridges connecting the mainland to the île, the site is easily accessible from the city center by foot and bicycle or by public transportation from the suburbs. The immediate neighborhood provides a heterogeneous environment, comprised of waste-lands, unbuilt plots, re-appropriated warehouses, and new residential developments. Close to Jean Nouvel’s Palais de Justice and the historical city center, the site is situated in a rich historical and contemporary context.
The architectural concept

Programmed spaces

- administration
- research offices
- exhibition space
- multimedia space
- media library
- studios/appropriable space
- parking
- sheltered exterior circulation

Unprogrammed spaces

Exterior spaces

- accessible terrace
- fabrication shop

Legend:
- Programmed spaces
- Unprogrammed spaces
- Exterior spaces
The school consists of a robust concrete post-and-slab structure with three floor plates at +9, +13, and +16 meters. A continuous ramp connects the floor plates to the school’s ground and rooftop, combining the exterior circulation system with a series of balconies and terraces. Running along the west and southwest façade, the ramp is approximately 120 meters long and has an incline of 5 to 7 percent. Wide enough to accommodate industrial uses, the sheer size of the ramp casts the school as a continuation of the urban street, denoting the floor plates as superimposed ground floors rather than stacked building levels.

In between the concrete floor plates, Lacaton & Vassal inserted a light steel structure that redivides the height of the main levels. Easily assembled and disassembled, this filigree structure accommodates specific programs on all three levels of the school. Linked to the single level classrooms, research facilities, studio spaces, administrative offices, and library are double-height volumes, which help regulate the school’s interior temperature. The floor-to-ceiling glass sliding doors that divide these two types of space establish an unobstructed visual relationship among spaces inside the school, in contrast to the blurred visual boundary between the school and its immediate surroundings that is provided by the building’s polycarbonate façade.
Level 0A
1. Auditorium
2. Event space
3. Storage
4. Nurse
5. Reprographics
6. Lobby
7. Cafeteria
8. Maintenance
9. Workshop office
10. Workshop
11. Exhibition space

Level 0B
1. Auditorium (250 seats)
2. Amphitheatre (150 seats)
3. Studios
4. Automobile and bicycle parking
Level 0C
1. Auditorium (250 seats)
2. Amphitheatre (150 seats)
3. Local association
4. Amphitheatre (100 seats)
5. Center for Architectural Research – CERMA

Level 1A
1. Common room
2. Library
3. Workspace
4. Association for Architectural Broadcasting – ARDEPA
5. Studios
6. Classrooms
7. Student services
8. Research facilities
Level 1B
1. Media library
2. Production annex
3. Studios
4. Classrooms
5. Student services

Level 2A
1. Studios
2. Coordination bureau
3. Coordination rooms
4. Workspace
Level 2B
1. Studios
2. Coordination bureau
3. Workspace

Level 3
1. Rooftop
Site design

Located on the banks of the Loire, the site benefits from an unusual adjacency to large open spaces, as well as to the dense city center, where land values are exceptionally high. Lacaton & Vassal decided to take full advantage of these two qualities, leaving no part of the site unbuilt and pushing the school’s façade to its outermost limits. The ground floor platform is repeated vertically in a three-level structure to maximize the site’s given surface area; the third floor plate doubles up to form an elevated public square, which is made accessible by the school’s exterior ramp. The school can be accessed by pedestrian and vehicular traffic from the Rue Lanoue Bras de Fer, which cuts across the site and divides the main body of the school from the annex facing the Loire.
The sustainable structure
Erecting, operating and maintaining the built stock today consumes a majority of the natural resources used worldwide, and is single-handedly responsible for half of the world’s waste production and a third of its energy consumption. In light of the considerable pressure that the industry places on our natural ecosystems, it is important to be critical of the act of building and how it deploys our available resources. However, to abstain from building is not always a possibility. Some buildings are programmatically specific and cannot be retrofitted or adapted to other uses; other buildings, like the old school of architecture, are too outdated to incorporate vital changes. Nor is not building always the right solution. Architecture still needs to meet present-day demands for housing, working environments, and infrastructure, especially as world populations continue to grow and urbanize.

In order to meet these needs without compromising the ability of future generations to meet their own, architects need to be mindful of the present and future life of buildings. This includes the daunting responsibility of considering a building’s afterlife – its maintenance, repair, eventual re-appropriation or demolition – throughout all stages of the design process. The cross-disciplinary approach that this task requires can be of great benefit to architecture. After decades of research, building technologies developed for agriculture and industry have refined their thermal and structural performance well beyond the advancements of architecture. By subjecting materials and buildings to a performatve logic, the Nantes School of Architecture offers a valuable example of how cross-disciplinary research can be brought to bear on the future life of architecture: the Nantes School of Architecture won’t need to be demolished at the end of its current form of use because its already programmed for the future.
The total volume of used material represented by a 20.06 meter cube

The total volume of used material represented by a 1.54 meter thick plate

Covered outdoor spaces: 11,390 m³

Intermediary spaces: 36,008 m³

Programmed spaces: 53,979 m³, of which 3,301 m³ are transformable parking spaces

Total building volume: 100,926 m³
Structural solution to flexibility

The project’s two-phase construction process programs both long and short-term flexibility into the structure of the school. Working with a medium-sized contractor specializing in prefabricated building systems, Lacaton & Vassal constructed a concrete-and-post structure of industrial strength. With a load-bearing capacity of 1 ton per square meter, which is 2.5 times the standard, the 90 cm thick floor plate is programmatically autonomous and chock-full of potential. The structure can accommodate functions that a conventional school cannot, such as the instalment of a full-scale fairground on its roof. The main concrete structure also supports the school’s second construction phase, which inserts an intermediary steel structure into the space. This lightweight structure installs the school’s programmed spaces in between the floor plates and creates an adaptable framework for their future expansion and evolution. The combination of these two systems streamlines the programmatic recycling of the structure: one is so vast and generic that the structure will never need to be demolished, the other is easily assembled and disassembled such that it will always be programmatically specific. “We are inspired by the concept of the loft,” Lacaton & Vassal explain, “we emulate the way we inhabit old industrial buildings today with programs that sometimes did not even exist when these buildings were first built.”1 Just as warehouses and factories are reappropriated for uses outside their original intention, what is now an architecture school can in the future become host to an altogether different program: a supermarket can be installed on the ground floor, the structure can be reappropriated for housing, offices or parking, and the rooftop can support impromptu large-scale rock concerts or fairgrounds. The atypical, heterogeneous, and oversized spaces designed for the school provide a framework for the building’s unpredictable evolution.

1 Anne Lacaton and Jean-Philippe Vassal, “Buy One, Get One Free” in Re-Inventing Construction, ed. Andreas Ruby and Ilka Ruby (Berlin: Ruby Press, 2010), 178.
**1st Phase:**
A post-and-slab concrete structure with three floor plates connected by a continuous concrete ramp.

**2nd Phase:**
An intermediary steel structure supports the school’s programmed spaces and creates four intermediary levels.

**Intermediary floor levels:**
The steel structure is enclosed by double glazed windows that are operable and equipped with shading systems.
Structural solution to energy efficiency
The establishment of two climatic zones integrates natural systems of thermal control to such a degree that the Nantes School of Architecture can do without mechanical cooling systems. The first zone consists of the school’s programmed spaces that feature standard insulation and heating. These areas are surrounded by unprogrammed double-height volumes, which, like horticultural greenhouses, optimize climatic conditions to produce an optimal interior temperature. Equipped with simple ventilation and shading systems, these spaces can adapt to warmer temperatures; in the height of the summer, half of the school’s polycarbonate façade can be opened up to allow for cross ventilation. The entire structure, with the exception of the auditorium and the restrooms, is naturally ventilated. During the winter, the polycarbonate panels capture the sun’s rays to generate solar heat gain. Reaching a temperature of 11 degrees Celsius in the winter, these spaces provide a buffer zone between the programmed spaces, which are heated by radiant panels, and the exterior climate, allowing for the implementation of smaller heating systems.
The climatic performance
Winter

The buffer zone captures solar heat gain and maintains a ten degree differential between the interior and exterior zones.

Winter diagram:
- Gas radiator
- Natural ventilation except for the auditorium and restrooms
- Buffer zone: 5° to 13°C
- Interior spaces: 20°C
- Polycarbonate panels: Opened in case of northern wind, Closed in case of southern wind
- Electric radiator: 5° to 20°C

Spring and Autumn

Upper ventilation panels are progressively opened so that the interior temperature does not surpass 20°C.

Spring and Autumn diagram:
- Electric radiator
- Interior spaces: 20°C
- Polycarbonate panels: Opened in case of northern wind, Closed in case of southern wind
- Buffer zone: 5° to 20°C
**Summer**
The façade is opened to fully cross-ventilate and passively cool the structure.

**Night time in Summer**
Nocturnal air currents refresh the school’s internal spaces and cool down the main concrete structure.
The sustainable school

The lived experience of small architecture schools is one of cramped and disorganized spaces. They become their own architectural dilemma and cannot adequately accommodate the school’s multiple academic production booms. It follows from this experience that the smaller an architecture school, the more complicated it becomes to incorporate its programmatic needs; and while architecture students have adapted considerably to subpar working environments, smaller schools often become too overwhelmed during times of rapid change to the discipline.

Large spaces are much more flexible by nature. The original brief calculated the school’s proposed surface area by applying a European standard of 10 square meters per student. Yet while this number may represent a baseline standard for an architecture school in the early 21st century, how will it respond to the school’s future expansion and evolution? In the coming years, as more people enter the higher education system, the student body will likely grow, requiring an expansion of the school’s studio spaces, workspaces, and classrooms – changes that can only be accommodated by thinking big.

To provide ample room for the development of the school’s student body and program, Lacaton & Vassal more than doubled the amount of available surface area from 12,500 square meters to 26,000. Produced at no additional cost, this extra space is vital to the present and future workings of the Nantes School of Architecture. It is able to absorb changes and resolve constraints with ease, which it demonstrated during its construction process when changes to parking policies and zoning laws saw the addition of a floor to the annex, the conversion of a second parking level into
studio spaces, and the transformation of a snack bar without a kitchen into a canteen that can serve 300 meals simultaneously.

**Unprogrammed vs. programmed spaces**
The Nantes School of Architecture can be divided into two types of spaces. The first type of space accounts for 15,000 square meters and consists of the program required by the competition brief (classrooms, research facilities, administrative offices). The second type almost doubles the project’s surface area by creating large, unprogrammed spaces, adding 5,000 square meters of double-height enclosed exterior spaces, plus another 6,000 of exterior terraces and balconies. Separated by floor-to-ceiling glass doors mounted on aluminum frames, programs can spill out of the first type of space into the second, whose generic surface area can be adjusted through the extension of the building’s intermediary structure. Tailoring the school precisely to the brief would have severely limited the project’s potential both as a building and as an architecture school; it would have resulted in the kind of neutral and generic spaces that make institutional buildings virtually undifferentiable. If the programmed spaces conform to the baseline minimum that an architecture school needs to function, then the unprogrammed spaces, which make up half of the school’s surface area, provide the school with new potential that is entirely unpredictable.

**The school as a pedagogical dispositive**
The unprogrammed nature of these extra spaces is laden with pedagogical potential, and extends the act of learning well beyond the school’s classrooms and studios. The standing invitation to re-appropriate the school’s enclosed exterior spaces teaches students that you cannot reduce the act of architecture just to building. For the architects, “it is of utmost importance to a student of architecture to experience that the production of
space is not simply equivalent with building anew,” instead, “it already takes place when you appropriate a given space.” The act of appropriation rejects the passive consumption of architecture. Instead, students are challenged to evaluate the potential of a space and to retrofit its existing structure to create desired spatial and programmatic conditions. Open to appropriation, the unprogrammed spaces allow the users of the school to redefine the standards of an architecture school. The production of a viable social space becomes an assumed risk shared by all inhabitants, allowing for the democratic and spontaneous creation of a social space that could never have been explicitly envisaged in the school’s original program.

1 Anne Lacaton and Jean-Philippe Vassal, “Buy One, Get One Free” in Re-Inventing Construction, ed. Andreas Ruby and Ilka Ruby (Berlin: Ruby Press, 2010), 176.
The greatness of any city can be judged by the way in which it responds to change. Prominent urban centers, like London and New York, have been successful in rejigging their urban fabric to offset sharp social, economic, and demographic shifts. The situation in Nantes is no different. The shift from a port economy to a service sector industry, which suffered a sharp decline in the last decade, left large areas of the city center blighted. To accommodate a growing population, the city of Nantes launched an official redevelopment campaign in 2001 to transform its city center into a livable neighborhood. It is within this context of the urban restructuring of the Île de Nantes that the school of architecture is situated. The school’s inclusion in the city is a defining characteristic, one that motivated both the decision to build the new school and its location. Embodying the qualities of its immediate context, the school becomes an urban œuvre: dense in its land use, adaptable and unpredictable in its open-ended structure, and truly sustainable in its resiliency.

The school as an extension of the city: The ground floor
The continuation of the asphalt street into the school of architecture is illustrative of the building’s character as a dialogue between the school and its urban context. When incorrect ground studies commissioned by the project manager suggested that the soil condition was not stable enough to support the school and that the ground floor would require a concrete base – thus compromising the design’s continuity – development reached a standstill. For Lacaton & Vassal it was imperative that the material of the ground should be of the same urban texture as the street, dissolving the threshold between the institution and the city, which often undermines a building’s ability to function as a public space. For fear of neutralizing the school’s public potential, Lacaton & Vassal also decided against placing the parking lot on the ground floor. After two years, the architects and the
project manager reached a compromise. Metal floors would be placed in the workspaces, which accounted for approximately 30% of the surface, with a majority of the ground floor maintaining the continuity between the school and the public street.

**The school as a public amenity**
Open to the general public, the Nantes School of Architecture offers numerous programmed and unprogrammed spaces for the appropriation and enjoyment of all. The school’s library, lecture series, and temporary exhibitions provide the city center of Nantes with a vibrant cultural life, which can be further enhanced through publicly initiated programming of the school’s exterior public spaces. The panoramic and robust rooftop can be used for both spontaneous and planned purposes, a neighborhood barbecue or an outdoor film screening, for example, and can withstand the activities of a full-scale circus or a rock concert. With a basic structure that is infinitely adaptable, the development of the school coexists with the development of the city. The structure becomes a balancing act between the needs of the students and the needs of the city’s residents, which often do not exclude one another.

Unprogrammed spaces can be rented out to generate surplus revenue for the school; in turn, the commercialization of these spaces can stimulate the local economy. As an educational institution, the Nantes School of Architecture attracts over 1,000 students, faculty, and staff to the center, balancing the city’s suburban development. This younger and more creative population acts as a catalyst to the center’s economy and cultural development, while also diversifying its public programs and amenities.
Lacaton & Vassal’s ability to produce extra space at no additional cost constitutes a radical break that challenges the standards on which architecture and sustainability are founded. The virtually unmediated relationship between a project’s budget and surface area is taken at face-value in architecture and is often used as a crutch: the smaller a budget, the lower the quality of the space. By optimizing construction costs, Lacaton & Vassal are able to modify this equation so that a minimum budget can translate into a maximum space. The surplus value generated by the use of efficient industrial and agricultural building systems is reinvested into the production of additional space. The performative intelligence of these systems gives rise to a new economics of architecture in which the budget is not judged by the price of a square meter, but according to the correspondence between the project’s total cost and its potential. For Lacaton & Vassal, it is this high capacity-to-cost ratio that makes industrial construction processes and greenhouse technologies so economically viable. More than doubling a slab’s load-bearing capacity only adds 5–10% onto the initial cost of the slab, a negligible price in comparison to the potential that it adds to the building, which can be programmatically recycled for virtually any use.

However, environmentally friendly and cost-cutting non-architectural building systems are not widely applied in architecture because they are neither widely known nor accepted. With the shift from the private to the public field, Lacaton & Vassal have found that regulatory bodies are reluctant to incorporate greenhouse technologies, regardless of their ability to withstand severe weather conditions and to regulate interior climates with greater precision than traditional architectural approaches. This surprising misalignment between sustainable standards and architectural building regulations reflects architecture’s outdated protectionist attitude.
Rather than learning from other disciplines how living conditions could be better designed, building regulations force architects to surround themselves with thick walls, small windows, and a maximum amount of insulation (whose greatest beneficiary is clearly the industry supplying the insulation material). It quickly becomes apparent that building codes push innovation into the margins of architecture; it is in these margins, at agricultural and industrial trade fairs, that Lacaton & Vassal search for innovative approaches to energy and resource efficiency, hoping to re-establish a line of communication between the allied fields of design and construction.

Lacaton & Vassal’s innovative application of non-architectural building systems culminates in the design of a structure whose robustness seems anachronistic in a sustainable discourse, which, being obsessed with the new and fixed on the future, fails to properly evaluate the past. The school of architecture is uniquely positioned in a line of buildings that have survived only because of their ability to be reprogrammed. These buildings range from the Hagia Sophia, whose conversion into a Mosque in 1453 saved it from destruction, to the factory loft, which is being re-appropriated all over the world for uses it was never originally intended for: residences, offices, schools, art galleries, etc. Diocletian’s Palace at Split has been in use for over 1,700 years, first as an imperial palace and later as a residential and shopping center. In 2006, the City Council of Split permitted the construction of over twenty new buildings within the palace, including a shopping and garage complex. The resolution was struck down a year later in the name of heritage and preservation, completely ignoring that this kind of programmatic and ideological recycling is at the crux of the palace’s heritage. By combining both traditional and contemporary notions of sustainability, i.e. the resilient mega structure with systems that
are temporary and precise, the school of architecture is able to remain structurally relevant through the present and well into the future.

Lacaton & Vassal’s logic of bypassing architectural building regulations warrants an evaluation of what exactly is at stake in abiding by a prescripted form of sustainability – particularly since the sustainability discourse deploys an armada of norms to reach sustainable conditions. Norms reflect the values of the time and the context out of which they emerge; and as new inventions in technologies and building techniques introduce alternative norms to established ones, the latter’s supporters have an interest in stalling the success of the former. As such, an exclusive focus on reaching sustainable standards does not always guarantee a sustainable building, especially since the shelf life of a norm is both unpredictable and unreliable. With entrenched financial interests supporting already established norms, applying new inventions in architecture becomes a political matter, where bureaucratic barriers push innovation outside of architecture’s reach. A well-reasoned transgression, however, can reach outside of architecture to offer innovative and unexpected solutions; it can reintroduce the missed potential that has previously been stifled by building regulations. In this light, a radical approach to sustainable construction would set up its camp in the trenches of this normative framework; it is from there that it would be able to renegotiate its own terms, establishing a territory in which all stakeholders could question the logic and relevance of the rules by which societies build.
Lacaton & Vassal Architects: Learning from Africa
Upon graduating from the Bordeaux School of Architecture in 1980, Anne Lacaton and Jean-Philippe Vassal moved to Niger, a former French colony. Born and raised in Casablanca, Morocco, Vassal had already cultivated a natural bond with Africa as a small child; returning as a young adult to complete his civil service, Vassal prolonged his stay by four years to continue his work as an architect and town planner in Niamey, the capital of Niger.

In the local architecture, Lacaton and Vassal perceived a value system that was radically different from the one that they had been taught in their native France. In countries like Niger, where the air temperature averages 40 degrees Celsius during the day and rarely drops below 25 to 30 degrees at night, architecture’s first obligation is to provide and maintain the cool conditions that are so vital to the inhabitants’ quality of life. To balance this desire with the limited resources at their disposal, locals use the territory to their own advantage. With only a minimum amount of sheltered, interior space – a tent – the Tuareg nomads perform most of their daily routines outside, moving from one
Located on an elevated dune, the site enjoyed a panoramic view from the hill down to the river that separated it from Niamey.

Located on an elevated dune,
spot to another in search of shade, depending on the course of the sun. “In this way,” Vassal explains, “the Tuareg ‘live’ their way through a territory along a route that starts at the tent in the morning and ends up there as well in the evening.”¹ The act of architecture in Niger is also nomadic one. Due to a lack of resources, locals habitually construct makeshift shelters out of retrofitted materials. These structures, some of them as basic as stretched t-shirts over twig frames, are spontaneously assembled and disassembled once they have outlived their use. Unaffected by a priori expectations of architectural form and longevity, these minimal and rudimentary structures are as functional as they are poetic in their temporal relationship with the territory.

During their stay in Niamey, Vassal built a house for himself on the bank of the River Niger. Although it only lasted for two years, its importance as a permanent diagram for the development of Lacaton and Vassal’s work cannot be underestimated. Located on an elevated sand dune and comprised of

a round volume with a structure made of twigs, straw walls, and a rice matting roof, the house let in fresh air currents from the river and blocked out the blazing sun. The main volume consisted of two concentric circles. The innermost circle, sheltered by both a wall and a roof, furnished the house with just the right amount of interior space, while the outer room acted as neither a fully interior nor exterior space.

Adjacent to this main volume, Vassal constructed a hangar. Sheltered from the sun, this space effectively doubled the project’s surface area and functioned as an inhabitable exterior room. In combination, these three spaces created a gradual threshold from the interior and innermost circle of the house to the exterior landscape, to be occupied according to current weath-
er conditions. The spatial organization of the straw hut embodied the African principle of living *en plein air* and provided Lacaton and Vassal with an alternative model to Western architecture, which, caught up with a protectionist attitude, disconnects the building from the outside world. In the straw hut, the firm boundary of the insulated wall was replaced with
the permeability of the straw fence, mediating between the constructed interior conditions and the reality on the ground.

Returning to a climate that is unfavorable to living *en plein air*, the use of greenhouse systems emerged as a way to incorporate exterior spaces into
Lacaton & Vassal’s work. Through the use of simple ventilation and shading systems, the greenhouse carefully balances exterior brightness and temperature with interior air-flow and humidity in order to create an optimal interior climate. In the Latapie House, 1993, Lacaton & Vassal attached a conservatory to the main body of the house, which contains all the spaces...
detailed in the brief and offers a normal interior climate. During the winter, the conservatory’s semi-transparent polycarbonate façade captures the warmth of the sun and creates an interior temperature that is slightly warmer than the outside. Equipped with operable ventilation panels, the façade can be partly opened to cross-ventilate the conservatory during the summer, producing a climate so pleasant that the inhabitants have re-appropriated this space as an extension of their living room. What becomes apparent in the Latapie House is that the treatment of a climatic threshold as a volume rather than a surface has a profound spatial implication. By displacing the project’s boundary to include an enclosed exterior space, the greenhouse becomes an extension of the original dwelling house.

When applied to larger projects, this principle causes a dramatic jump in scale. In the Nantes School of Architecture, the conservatory takes the shape of double-height polycarbonate clad volumes which, in addition serving a climatic function, add 5,000 square meters of “extra space”; combined with the school’s exterior spaces, these unprogrammed spaces double the project’s surface area.

The sheer size and openness of the unprogrammed spaces inject the school with a potential that Lacaton and Vassal first discovered in the public spaces of African cities. In the Djeema-el-Fnaa square, Lacaton and
Vassal observed a dynamic relationship between the built fabric and people. Located in the city center of Marrakesh, Morocco, the bustling square is by no means pre-defined by its architecture, as is often the case in public spaces in Europe. Instead, with no formal divisions, the square receives its definition from the spontaneous activities it hosts and the ebb and flow of crowds and traffic that pass through it on a daily basis. In projects large enough to acquire an urban scale, such as the Palais de Tokyo in Paris, the square emerged as an example of how activities within a space could be liberated from the straitjacket of the plan.

In the design for the Nantes School of Architecture, the square provided a critical insight to how unprogrammed spaces could engender new and unexpected dynamics, embodying the potential and life of large spaces that makes them infinitely adaptable.

Nathalie Janson
### Project data

- **Building type:** architecture school (studios, classrooms, workshops, auditoriums, library, exhibition spaces, administrative offices, research facilities, cafeteria)
- **Site area of the project:** 5,375 m²
- **Construction period:** 2006 – 2008
- **Construction cost (Building Cost Plan 2 with fees):** €17.75 million net (val. 2008)

### Building areas

- **Building footprint:** 5,260 m²
- **Gross floor area:** 26,837 m²
- **Basic program:** 15,150 m²
- **Extra space:** 4,430 m²
- **Outside terraces:** 5,305 m²
| Building owner       | Ministry of Culture and Communication of France  
|                     | École Nationale Supérieure d'Architecture Nantes  
|                     | 6, Quai François Mitterrand, 16202 – 44262 Nantes, France  
|                     | Philippe Bataille, director, and Isabelle Bettschart, architect, technical and maintenance management of the school  |
| Owner's technical agent (pilot) | OPPIC; 13, Rue du Chateau des Rentiers, 75013 Paris, France  
|                     | Nadia Boulay and Pascal Jaquot  |
| Architects          | Lacaton & Vassal Architects; 206 Rue la Fayette, 75010 Paris, France  
|                     | Anne Lacaton, Jean-Philippe Vassal, Florian de Pous, project manager, Frédéric Hérard, project assistant; Julien Sage-Thomas, Julien Callot, Lisa Schmidt-Colinet, Isidora Meyer, David Pradel |
| Energy concept      | Lacaton & Vassal + Setec Bâtiment  |
| Concrete structure  | Setec Bâtiment; 58, Quai de la Rapée, 75583 Paris Cedex 12, France  
| and technical       | Alain Bourdon and Rémy Jolain  |
| systems             |  |
| Metal structure     | Cesma structural engineers; 16, Av. Maréchal Joffre 33700 Merignac, France  
|                     | Mariusz Stanik  |
| Construction        | E.2.I.; 11, Rue Jean Jaurès BP 74, 68502 Guebwiller Cedex, France  
| Cost Consultant     | Jean Marc Heitz  |
| Acoustics           | Jourdan Acoustique; 57bis, Bd des Arceaux, 34000 Montpellier, France  
|                     | Gui Jourdan  |
| Fire Safety         | Vulcanéo; 59, Av. de l'Europe, 92408 Courbevoie Cedex, France  
| Consultant          | Christian Rincel  |
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Pages 72–81: Lacaton & Vassal Architects, Paris, France

**Diagrams**  
Lacaton & Vassal Architects, Paris, France

**Sources**  
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Anne Lacaton and Jean-Philippe Vassal, “Two Conversations with Patrice Goulet: Conversation 1,” Interview by Patrice Goulet,  

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Ilka & Andreas Ruby
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