

On the architectural laboratory as a hybrid interface between theory and practice

Bechara Helal

Université de Montréal, Montreal (Quebec), Canada

ABSTRACT: Architecture as a discipline is focused on the architectural project. But whereas professional designers produce architectural projects, academic researchers use the architectural project as an object of study in order to produce new theoretical knowledge. This clear distinction between the goals of professionals and academics has divided the field into two groups, a polarization that mirrors the often-mentioned opposition between design and practice on one side and research and theory on the other. However, in recent years, what appears to be a hybrid model incorporating both these approaches has been emerging: the architectural laboratory. The scientific laboratory is a space where new knowledge is produced and is therefore naturally linked to academic institutions and to research. However, since their emergence at the end of the 19th Century, architectural laboratories have been appearing as much in the academic field as in the field of professional practice. If all the activities at the heart of the scientific laboratory are related to research and to the production of theoretical knowledge, one can wonder why architectural firms would choose to refer to this model to describe their design practices. Are these references to the laboratory model in the naming of professional architectural firms a sign of practices that go beyond “traditional” design? Do these professional “architectural laboratories” incorporate a research approach that was once only found in academic environments? What exactly is an “architectural laboratory”?

This presentation will discuss the hybrid nature of the practices at the heart of the architectural laboratories by considering and comparing two remarkable cases. The first, the *Laboratory for Visionary Architecture* is a contemporary professional practice set up in 2007. The second is a series of interrelated academic laboratories that have been set up since 2002 within the Graduate School of Architecture, Planning and Preservation (Columbia University). Through a description and comparison of the productions of these cases, we will offer a clarification of the figure of the architectural laboratory and show how this emerging model is an indicator of a tightening hybridization of the once distinct activities that are theoretical research and design practice.

KEYWORDS: architectural laboratory, design thinking, architectural research, architectural knowledge

INTRODUCTION: THE “GREY ZONE OF ARCHITECTURE”

Architecture is often described in terms of absolute binary oppositions: practice / theory, design / research, profession / discipline. Two distinct characters emerge from such a point of view. On one side is the professional architect who solves specific pragmatic problems through the design of suitable objects. Opposite him, on the other side, is the academic architect who, by considering new questions and through a process of research, builds theoretical knowledge that contributes to the construction of the discipline as a whole. Even though both are seen as architects, one is called a designer and the other a researcher, and the wall separating them, sacred to many, often seems unbreakable. Challenging this viewpoint, architect Esa Laaksonen introduces the notion of a “grey zone of architecture” where practice and research are linked:

The borderline [between practice and research] has been increased in scale and could be interpreted as being extended into a kind of border zone, an area of architectural opportunities. When operating in this border zone, practice and research meet and intermingle, and perhaps in theory mutually benefit each other. What could this theoretical grey border zone of architecture be in practice? (Laaksonen 2001, 7)

According to Laaksonen's hypothesis, the activities of architects in the context of practice (the designers) and those of architects in the context of research (the researchers) should not be seen as total opposites, but rather as complementary. From this complementarity would then emerge new activities relating as much to practice as to research, therefore bridging the gap between design and research. This paper will address the issues raised by Laaksonen's hypothesis of a "grey zone of architecture" through a study of the figure of the *architectural laboratory*. It will specifically focus on the activities carried out within the walls of a number of such entities, and on the place occupied by design and research within this new space of production. Are architectural laboratories spaces of pure research exclusive to the academic context? What does the emergence of the laboratory say about the contemporary practices that constitute the discipline of architecture? These are the questions that this paper will address. Given the relatively recent apparition of the architectural laboratory, the knowledge available on this type of workspace is still limited. It is therefore necessary to first proceed with a more in-depth analysis of the architectural laboratory as a recognizable phenomenon. Two case studies presenting remarkable and complementary characteristics will be then covered. Finally, the observations from these two case studies will be discussed in order to offer answers to the raised questions.

1.0. ON RESEARCH AND DESIGN

As the notions of research and design are central to this paper, it is necessary to briefly but clearly explicit from the onset what they stand for and to highlight what differentiates them in order to better understand how they can be seen as complementary.

Design can be described as "a planned and target-oriented process," of which the goal is "the creation of a project with specific circumstances and intentions that can be implemented" (Gerber, Unruh, and Geissbühler 2010, 27). The result of design is therefore unique and not generalizable as it is embedded in a particular context and related to a particular problem that requires solving. In this sense, design can be considered here as an artistic process: the architect-designer produces a new and unique work for every problem he has to solve. He is similar to the artist producing "works of art" in his studio: every finished work is unique, personal and distinct from the rest of the artist's production.

Research can also be described as "a planned and target-oriented process, the results of which must be general and provable" (Gerber, Unruh, and Geissbühler 2010, 29). These results are also clearly expressible in words, and repeatable by other researchers, but above all, they are transmissible. They are ideas that take the form of explicitly formulated knowledge (a theory, a manifesto, a text), the sum of which constitutes the discipline of architecture. In the context of this paper, research is therefore seen as a scientific process: the architect-researcher builds new but generalizable knowledge that is added to previously available knowledge built by others to form an ever-evolving entity. In this sense, the architect-researcher is similar to a scientist in his laboratory, contributing to a body of knowledge constantly in progress.

This strong distinction between design and research as two extremes may appear too extreme. One could argue, with reason, that all designed objects include implicit knowledge that can be extracted and turned into explicit knowledge. For example, one could think of the very particular but important case of the villas that Le Corbusier and Pierre Jeanneret designed in and around Paris in the 1920s. Architectural historian Tim Benton describes these villas as "a radically new orientation for architecture that have made them central points of reference for all subsequent generations of architects right up to the present" (Benton 1987). These projects can be considered architectural precedents and influence future designers, but they cannot be considered, in themselves, as explicit knowledge. The implicit knowledge they hold is made explicit only when Le Corbusier adopts a reflexive stance on his own work and publishes, in 1926, his theory of the "5 points of architecture". This theory, which Le Corbusier himself described as laboratory findings – "acquits de laboratoire" (Le Corbusier and Jeanneret 1929, vol.2, 24) – is very clearly generalizable, expressible and transmissible knowledge, and has

structured a large production of modern architecture. The difference between the Parisian villas (the physical objects) and the 5 points of architecture (the theoretical knowledge) is a clear example of the distinction we want to highlight between the design process and the research process.

2.0. ON THE ARCHITECTURAL LABORATORY AS AN OBJECT OF STUDY

The opposition between design and research can be linked to a discussion on the place of work of the architect. Unlike the places of work of the artist and of the scientist which are clearly identified as distinct spaces (namely, *the studio* and *the laboratory*), the place of work of the architect is defined by analogical associations. The strongest of these associations is the one that links architecture to the arts and that can be traced back to the Beaux-Arts origins of the discipline: following this association, the architect's workplace has always been commonly identified as a *studio*, a direct reference to the workplace of the artist. But a new type of workspace has been emerging in the field of architecture, that of the *laboratory*.

It would be tempting to directly tie the activities of the architect, the context in which they take place and the identification of the place of work. Following such an approach, the architectural studio would be a place of design in a professional context and would therefore be the space of the architect-designer.ⁱ In the same way, one could envision a direct relation linking the laboratory, the academic context and the activities of research. This approach would yield the hypothesis that the architectural laboratory is essentially a place of research within an academic context, and would therefore be the space of the architect-researcher.

In order to test this hypothesis and address the issues underlying the "architectural laboratory", it is necessary to first identify it as a structured and cohesive phenomenon. For the sake of clarity and impartiality, only architectural entities directly self-identified as "laboratories" (either by name or through their description) have been considered. This very important limitation ensures that what is measured is the actual fascination by architects for this type of space: in other words, the image of the laboratory in the mind of architects.

An exhaustive compilation of architectural entities explicitly referring to the laboratory in their identification clearly shows what a phenomenon that is characterized by an exponential growth ever since its emergence at the end of the 19th century (Figure 1). Since the beginning of the 21st Century, the number of architectural laboratories has increased three-fold as close to 150 laboratories are currently in operation.ⁱⁱ

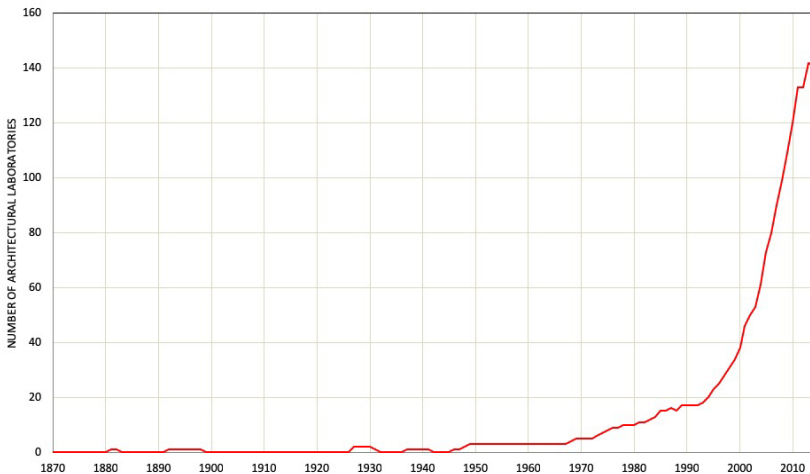


Figure 20. Inventory of entities in the field of architecture explicitly identified as laboratories

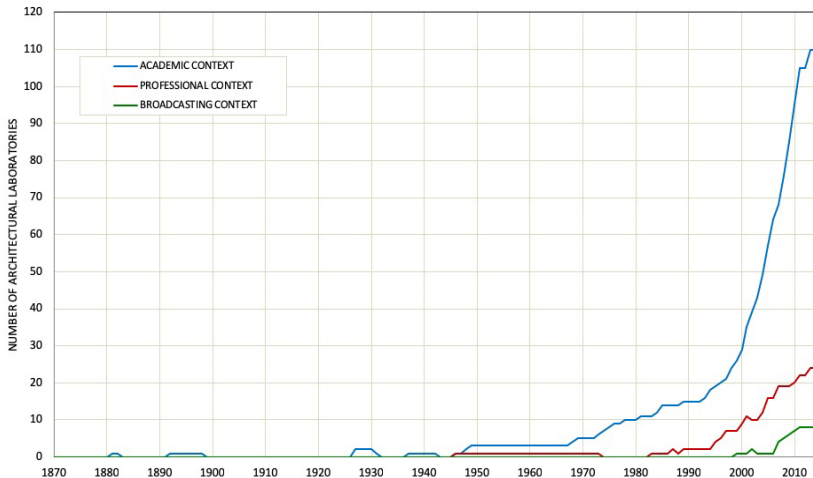


Figure 21. Inventory of entities in the field of architecture explicitly identified as laboratories organized along the context within which they are set (academic, professional, broadcasting)

A more in-depth analysis of this survey of architectural laboratories can be done by distinguishing the context within which they are set up. For the sake of this analysis, three contexts were considered (Figure 2). The *academic context* includes all activities set up within the walls of architectural academic institutions. The *professional context* includes all activities that are part of the professional practice of architecture. The *broadcasting context* includes all architectural activities related to the presentation, publication and broadcasting of architecture (such as museums, exhibitions, journals, etc.). This clarification shows that, although the first cases are set within the structures of architecture schools, architecture laboratories appear within the professional field of architecture as early as the middle of the 20th Century. Three phenomena take place at the turn of millennium: 1) the apparition of architectural laboratories in the broadcasting context; 2) a constant increase of the number of laboratories in the professional context; and 3) an explosion of the number of laboratories in the academic context. Today, most architectural laboratories operate in an academic context (over 77%). Today, almost 16% of active architectural laboratories are set up in a professional context and 7% are related to the broadcasting context. These numbers are significant and indicate that there could be more to the laboratory than implied by the hypothesis formulated at the beginning of this paper.

In order to properly understand what the architectural laboratory stands for, it is necessary at this stage to study specific architectural laboratories from distinct contexts. In this paper, we will focus on two cases taken from the compiled repertoire of architecture laboratories, the first set within the professional context, the second within the academic context. As we will see, these cases must not be considered as generalizable models, but rather as remarkable devices enabling new insights regarding the questions addressed here.

3.0. THE ARCHITECTURAL LABORATORY WITHIN THE PROFESSIONAL CONTEXT: THE LABORATORY FOR VISIONARY ARCHITECTURE [LAVA]

LAVA (the *Laboratory for Visionary Architecture*) is an architectural practice set in the professional context founded in 2007 by Chris Bosse, Tobias Walliser and Alexander Rieck, three young German-born architects whose work prior to the founding of LAVA has been widely recognized. Chris Bosse was a key designer for the Australian firm PTW Architects of the Beijing National Aquatics Centre built for the 2008 Summer Olympics whereas Tobias Walliser was UN Studio's main designer for the Mercedes-Benz Museum (2001-2006).

The naming of the young professional firm, the *Laboratory for Visionary Architecture*, is remarkable as it puts in relation the two complementary approaches of interest in this paper, i.e. research and design. On one hand, as previously discussed, the laboratory can be seen

as a reference to scientific theoretical research, and, as such, it is quite surprising to find it in the professional context of architecture where design entities have predominantly been identified as “studios”. On the other hand, the notion of “visionary architecture” is a direct call to avant-gardist and innovative architectural production. This is not a “laboratory of visionary architecture” that intends to study existing projects with special qualities, but a “laboratory for visionary architecture” that wants to produce new architectural objects of a certain type, an attitude favoring action which is in accord with the role of all professional firms.

The text presenting the young firm uses the same kind of rhetoric:

At the vanguard of a nonconformist and inventive new generation in architecture, LAVA bridges the gap between the dream and the real world. LAVA operates as a unique think tank with branches placed strategically worldwide. It has been formed by some of the most experienced and forward thinking architects from around the globe (Laboratory for Visionary Architecture (LAVA) 2012b).

“Vanguard”, “nonconformist”, “inventive”, “new generation”, “forward thinking”: all these terms indicate a desire to cut from the past and project into the future similar to the one that moved the artistic and architectural avant-gardes. In other words: an intention to design. But, at the same time, this text presents LAVA as a “think tank”, which implies theoretical research carried out within a collaborative structure. This collaborative structure is central to LAVA, as the firm is composed of two distinct poles: LAVA Asia located in Sydney, Australia, and LAVA Europe, located in Stuttgart, Germany. Chris Boss is the director of LAVA Asia, while Tobias Walliser and Alexander Rieck are the co-directors of LAVA Europe. In addition to these two headquarters, two new poles located in Abu Dhabi (United Arab Emirates) and Shanghai (China) have been set up because of the amount of work the firm has been commissioned to do in these regions. Because of this multipolar structure, work at LAVA is organized around a series of exchanges, as the projects and the knowledge attached to it have to be continuously transferred from one node of the network to another. This is so embedded in LAVA’s structure that a world map presenting the transfers is available on the website of the firm (Figure 3).

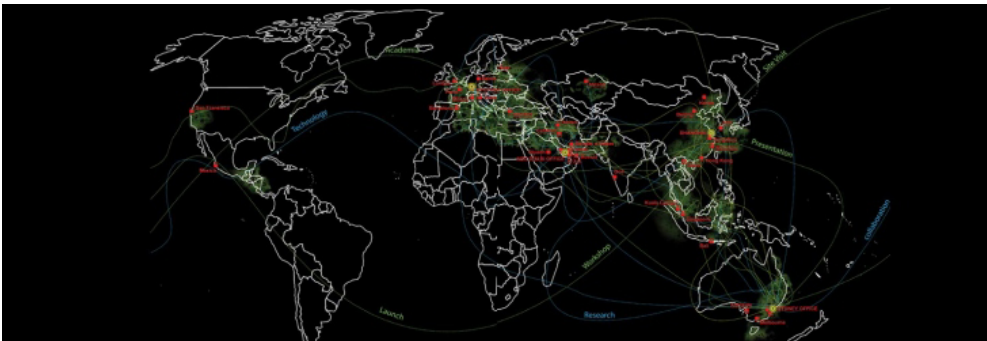


Figure 22. Map of the activities of LAVA (poles in yellow, projects in red, design transfers in green, research transfers in blue) Source: (LAVA, 2012)

On this map, the main nodes of the LAVA network are identified in bright yellow (Sydney, Stuttgart, Abu Dhabi, Shanghai) while the projects the firm has worked on are the smaller red dots. But what is of real interest here are the exchange vectors. These are separated in two groups as a distinction is made between the transfer related to the design activities of the firm (the green lines: *site visit, workshop, presentation, launch*) and the ones related to the research activities (the blue lines: *collaboration, technology, research*). This classification clearly underlines the importance for the architects of LAVA of distinguishing design and research, while, at the same time, including both in the activities of the firm.

The research activities as identified on LAVA’s map can be seen as personal research, i.e. activities intended to contribute to the evolution of the firm as a closed and independent entity. Such a point of view is discussed by Michael Weinstock, Director of Research and Development, and Director of the Emergent Technologies and Design program in the Graduate School of the Architectural Association School of Architecture in London, England. In an article

focusing on Chris Bosse of LAVA, Weinstock identifies an evolution of the architect's design through a number of elements that appear to be developed from project to project:

While not every architectural design project can truly be said to be research, the work of Chris Bosse confirms that design research is possible for architects even while they are in practice. It can be pursued in constructed designs that extend existing ways of making forms and spaces, and in the development of innovative material systems. The pursuit of larger ambitions and grander research goals may be advanced by finding opportunities in more numerous small and ephemeral projects. The development of a research agenda in the context of a continuing series of small constructed projects is an evolutionary strategy appropriate to both architect and client. The architect stands to gain knowledge and expertise, and the client stands to gain an innovative design that is built on a previous success (Weinstock 2008, 115).

This is certainly an interesting view of research, but it is one that is limited to the personal gain of knowledge and expertise by the designer himself. As we will see, what really makes research at LAVA stand out is the relation it implies with the discipline of architecture as an *intellectual community*. The close interrelation between the activities of research and design is also put up front in the presentation of the firm, as LAVA is described as having been “established as a network of creative minds with a research and design focus” (Laboratory for Visionary Architecture (LAVA) 2012a). Contrary to Chris Bosse and Tobias Wallisser who were architecture practitioners before founding LAVA, Alexander Rieck, the third co-founder, comes from the field of academic research: prior to LAVA, Rieck was a researcher at the Fraunhofer Institute, Europe's largest applied research organization,ⁱⁱⁱ where he specialized in virtual reality environments. During his time at the Institute, Rieck led many research projects, participated in scientific conferences, and authored a number of publications on working environments and building processes. In other words, his activities were those of a researcher in the context of a scientific institution. Even though the research at Fraunhofer Institute can be considered as applied research (as opposed to theoretical research), it is nonetheless remarkable that an important member of a professional firm comes from a research environment.

One could wonder if the fact that one of the directors of a professional firm is a scientific researcher implies that the firm would develop clearly identified research activities in addition to the design activities it traditionally displays. That is precisely the case with LAVA, which has set up such activities through reciprocal exchanges with the Fraunhofer Institute. An example of these exchanges, highlighting the transfers from research to design, is the project of the *LBBW Immobilien Headquarters* (Stuttgart, 2008) which was based on the findings of *Office 21*, a research project Alexander Rieck had led at the Fraunhofer Institute. Another example, this time underlining the contribution of design to research, is the *Future Hotel* (Duisburg, 2008), a research project at the Fraunhofer to which LAVA contributed as external consultants. In this case, the work of the professional architects was essential to the production of theoretical knowledge.

The intertwining of research and design is also evident in the multiple roles the directors play. Parallel to their professional practice, all three directors of LAVA occupy positions in the academic context. Chris Bosse is Adjunct Professor at the University of Technology, Sydney. Tobias Wallisser is Professor of Innovative Construction and Spatial Concepts and Vice-President at the State Academy of Fine Arts in Stuttgart. Alexander Rieck is a senior researcher at the Fraunhofer Institute in Stuttgart. LAVA is a fascinating case of an architectural laboratory that is structured around design activities within the professional context, while maintaining, at the same time, strong links to research and the academic context. This case is a first example that appears to invalidate the hypothesis that the laboratory is only a place of scientific research set within the limits of the academic context.

4.0. THE ARCHITECTURAL LABORATORY WITHIN THE ACADEMIC CONTEXT: THE LABORATORIES OF THE GSAPP AT COLUMBIA UNIVERSITY

This second case study will analyze a group of architectural laboratories set within the academic context: the 28 laboratories of the Graduate School of Architecture, Planning and

Preservation (GSAPP) of Columbia University, one of the major centers of the architectural pedagogical landscape. The number of laboratories at GSAPP has increased very rapidly, as all 28 laboratories currently active within the school were set up over less than a decade, between 2003 and 2012.^{iv}

Following the idea that a laboratory is originally a space of scientific research, the fact that laboratories exist in the architectural academic context may seem natural. But this fact can be surprising in itself given that, most often than not, architectural thinkers, historians and philosophers have always done their research work alone, in their own offices. If they ever had a collaborative research structure, it was usually identified as a “research unit.” The apparition of laboratories in the academic context and their rapid increase (as shown in Figure 1) could possibly imply a new approach to research. Given the large number of laboratories at the GSAPP, it is reasonable to think that an analysis of the activities within their walls would give good indications of the real nature of the architectural laboratory in the academic context. This analysis has been carried out by focusing on the type of results the laboratories produce.^v The results are only of two possible kinds: either *explicit knowledge* (through publications) or *recognizable objects* (i.e. projects). By its simplicity, this binary grid enables a clear understanding of the nature of the laboratories (Table 1).

According to this analysis, four distinct cases are possible: 1) the production of publications only, 2) the production of projects only, 3) the production of both publications and projects, and 4) no productions at all. The compilation of the results of this analysis paints an unexpected portrait of the architectural laboratories of the GSAPP (Figure 4). While 30% of the laboratories focus on the production of knowledge through publications, another 20% are more concerned with the production of projects. These laboratories can be seen as situated at both extremes of the design / research spectrum. Only a minority (13%) produces knowledge *and* projects at the same time: these entities can be seen as elements fluctuating between the two above-mentioned extremes. These cases bring back to mind the notion of the “grey zone of architecture” formulated by Laaksonen in which research and design meet. But what is most important is that a very large number of the laboratories of the GSAPP (37%) do not produce anything: neither projects, nor publications.

What stems from this analysis of the laboratories of the GSAPP is that the architectural laboratories are not of a single kind, and, based on the results shown here, one could make the distinction between four distinct types of architectural laboratory (Figure 5):

1. The first type of laboratory is exclusively a space of research and of production of knowledge (production of publications only) and can be labeled as *a laboratory for thinking*.
2. The second type of laboratory is a space of research that integrates activities of design (production of publications as well as of projects) which could be described as *a laboratory for thinking and making*.
3. The third type of laboratory drops completely the research approach and becomes a space dedicated to creation and design (production of projects only) which could be labeled as *a laboratory for making*.
4. The fourth type of laboratory goes *beyond* the opposition of design and research and therefore situates itself beyond the “grey zone of architecture.” This type of laboratory is hard to label by referring to the activities of thinking and making as it does not relate to any of these poles. A possible label would have to take into account the only clear characteristic of these laboratories, which is that they exist: *the laboratory as a platform*.

Of these four types, the most interesting is assuredly the last one. As of 2011, it is the type of laboratory that is the most present within the context of the GSAPP and, as such may prove to be an indicator of major transformations within the discipline of architecture.

Table 4. Analysis of the production of the architectural laboratories of the GSAPP (Columbia University)

LABORATORY IDENTIFICATION	FOUNDATION DATE	TYPE OF PRODUCTION	
		PUBLICATIONS (EXPLICIT KNOWLEDGE)	PROJECTS (RECOGNIZABLE OBJECTS)
Urban Landscape Lab	2003	x	x
Technological Change Lab	2003	x	
Sustainable Urbanism International	2003	x	
Spatial Information Design Lab	2004	x	
HQ of Japanese Architecture	2004	x	
Columbia Lab For Architectural Broadcasting (C-Lab)	2005	x	
Laboratory for Applied Building Science	2005		x
Conservation Lab	2005	x	x
Urban Design Lab	2006	x	x
China Megacities Lab	2007		x
Network Architecture Lab	2007	x	
Space Lab	2007	x	x
The Community & Capital Action Research Lab (C2ARL)	2008	x	
S.L.U.M. Lab: Sustainable Living Urban Model Lab	2008	x	x
Studio-X New York	2008		
The Data Visual (2009 symposium)	2009	x	
Living Architecture Lab	2009		x
EKS Radio	2009		
Amman Lab	2009		
Studio-X Beijing	2009		
Non Linear Solutions Unit	2010		x
Latin American and Caribbean Laboratory (LatinLab)	2010	x	
Studio-X Mumbai	2010		
Studio-X Rio de Janeiro	2011		
São Paulo Lab	2011		
Tokyo Lab	2011		
Studio-X Moscow	2012		
Global Africa Lab	2012		x
Studio-X Istanbul	2013		
Studio-X Johannesburg	2013		

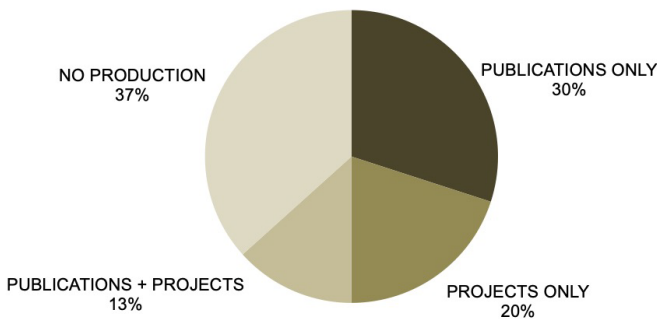


Figure 23. Type of production of the architectural laboratories of the GSAPP (Columbia University)

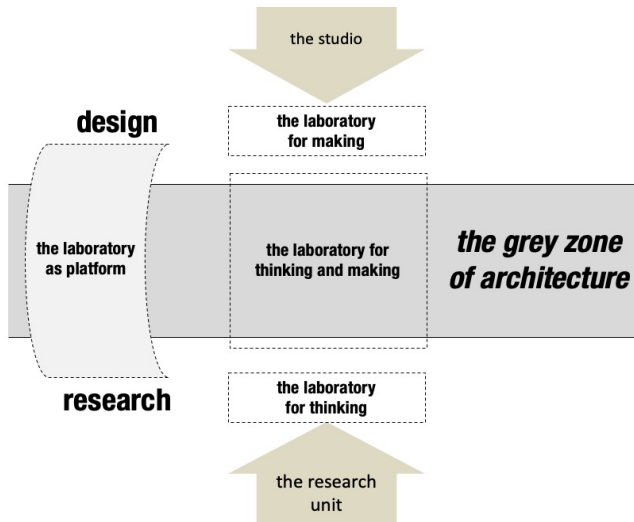


Figure 24. Types of architectural laboratories and their relationship to design and research

CONCLUSION: A COLLECTIVE BRAIN FOR THE EXPERIMENTAL AGE

The hypothesis set forth at the beginning of this paper was that the architectural laboratory could be seen essentially as a place of research within an academic context. The case studies presented in this paper have refuted this hypothesis in two major ways.

First, the architectural laboratory is not limited to the academic context but can now be found in all contexts constituting the large field of architecture (academic, professional and broadcasting).

Second, the activities within the walls of the architectural laboratory are not limited to research. The case study of the *Laboratory for Visionary Architecture* [LAVA] has shown that the laboratory exists in the professional context, outside of the academic context, and that it houses as much design activities as research activities. The case study of the laboratories of the GSAPP at Columbia University has also shown us that, although laboratories exist in the academic context, they are not necessarily dedicated to scientific research: some integrate design activities while others are entirely focused on the design of projects. The two cases have therefore shown us that the laboratories occupy a large space within the “grey zone of architecture” hypothesized by Laaksonen: they are on either side of this gap as well as occupy its centre.

But what the case of the GSAPP has shown us is that some very recent laboratories go beyond this “grey zone”, by acting as bridges and thus ignoring the traditional gap between design and research altogether as they do not produce any new projects or knowledge. What exactly are these particular laboratories and what exactly takes place inside their walls?

All the laboratories that do not produce any new knowledge or objects are part of the *Studio-X Global Network Initiative* set up under the direction of Mark Wigley, Dean of the GSAPP between 2004 and 2014. His description of this program is eloquent and deserves to be extensively quoted:

The vision of the Studio-X global network is to establish a unique exchange of ideas and people between key regional leadership cities around the rapidly evolving globe. [...] The aim of this exchange is a global partnership able to offer support to the highest possible level of reflection on the new realities and active, intelligent, and productive engagement with those realities. [...] Each Studio-X acts as an open platform for collaborative research and debate with a publication gallery, an exhibition gallery, a lecture space and an open studio workspace. During the day, the Studio-X is an active workshop, with combinations of ever-shifting teams of local experts and visitors from the region or globe working on designs, reports, exhibitions, books, competitions, films, magazines, etc. During the evening, the Studio-X acts a hub of social exchange and intense debate with a lively program of exhibitions and events. It is a hot spot in the city, buzzing with social energy,

invention, and dedication to a better future. [...] With the addition of each hub in the network, this radical experiment in redefining the role, responsibility, and capacity of globally collaborative modes of education, research and action, increases its bandwidth exponentially. A new kind of collective brain is emerging (Wigley 2009).

The central notion on which the *Studio-X Global Network Initiative* is built is the idea of *collaboration*. In other words, the Studio-X global initiative is a series of interconnected super think tanks disseminated around the globe and organized within a structured network, each of these think tanks attracting local expertise in order to maximize the transfer of theoretical knowledge and professional expertise at a global scale. The “new kind of collective brain” that Wigley envisions with the launching of the *Studio-X Global Network Initiative* is not focused on design or research, but rather integrates both as *complementary* activities that need to be considered simultaneously and the laboratory is the place where this hybridization of design and research takes place. The vision of the Studio-X global initiative does not include the planned production of new knowledge or new projects. In this sense, the network envisioned by Wigley locates itself neither within the traditional opposition between design and research, nor within an intermediary “grey zone of architecture” suggested by Laaksonen where design and research “meet and intermingle” (Laaksonen 2001, 7). The Studio-X laboratories are simply closed boxes where anything related to architecture can happen without being necessarily planned or organized: in this sense, they are empty spaces waiting to be invested, occupied and turned into platforms within which architecture as a field is unified again. This is precisely how Brazilian architect Pedro Rivera, director of the Studio-X Rio, answered as he was asked to describe his laboratory: “The basic concept is very simple—an empty space with an espresso machine” (Studio-X Global Network Initiative 2011).

In conclusion of this paper, the architectural laboratory appears as an environment that is neither the result of a mutation of the artistic studio where works of art are designed, nor a direct analogue of the scientific studio where theoretical knowledge is researched. It must be seen and studied as an independent and hybrid type of workspace particular to the field of architecture where the focus is sometimes put on *architectural design*, sometimes on *architectural research*, and at times on the hybridization of both of these activities. But most importantly, it must be seen as a major new type of space central to the new “knowledge economy” where design and research are so closely intertwined as to become undifferentiated inside a new collective brain.

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ENDNOTES

ⁱ This appears may appear overly simplistic, as one could argue that architectural studios can be found as much in the academic context as in the professional context. But, architectural studios in an academic context are pedagogical environments in which students must solve given problems through the design of architectural objects. In other words, they are, more frequently than not, simulations of real-life professional activity.

ⁱⁱ As a note of warning, the compilation of architectural laboratories presented in this paper is as exhaustive as possible. In the context of a vast research we have undertaken on the figure of the laboratory in architecture, this database is continuously being updated in order to ensure a more precise reading of the phenomenon.

ⁱⁱⁱ The Fraunhofer Institute is composed of more than 70 research institutes, and employs over 25,000 people, the majority of which are qualified scientists and engineers. Its annual research budget totals €2.3 billion.

^{iv} It must be noted that, although the name of all these entities do not explicitly refer to the laboratory, they are nonetheless all part of what the GSAPP documentation clearly identifies as the school's "experimental laboratories."

^v The type of production of each of the GSAPP laboratories has been determined through the study of their public interface, i.e. their website. As the GSAPP website is constantly being updated, every possible effort has been made in order to exhaustively collect information even if it that has now been suppressed.