TAXONOMY OF A SERVANT SPACE

RESEARCH PLAN

GRADUATION STUDIO

Complex Projects Berlin

2022/23

COMPLEX PROJECTS
Bodies and Building

student
Stepan Serdiukov

chair
Complex Projects

main tutor
Hrvoje Smidihen

second tutor
Jelmer van Zalingen

email
infocpstudios@gmail.com

Instagram
https://www.instagram.com/cp.complexprojects/

website
https://www.tudelft.nl/bk/over-faculteit/afdelingen/architecture/organisatie/disciplines/complex-projects/

facebook
https://www.facebook.com/CP_Complex-Projects-422914291241447

INDEX

RESEARCH PLAN

01

Introduction

Studioframework"Bodies&Building,Berlin"
The rise of technological development of services, digitalization of a building and its influence on future design approaches is a main concern of the Complex Projects graduation studio. Within this topic , the studio will primarily focus on the notions of Bodies, Building and Berlin. Those concepts will show the connection between user demands and building performance in the context of the city of Berlin. They will be clearly exposed below.

Building
Within the studio brief, 'building' stands for a complex building that is functionally specific for a context of Berlin. From the personal interest in the complex nature of government buildings, that could include a variety of spaces from conference halls to small offices, the typology of Ministry of Foreign Affairs was chosen for research investigation. Spaces that a government budling is supposed to accommodate, require to be accompanied by services that would allow building perform its function. Those spaces for services would consequently be called in this research as a 'servant space'.

Body
The notion of a 'body ' stands for a demand of those services that users expect from the building to offer, to be able to perform in a satisfactory way: better circulation, higher level of security, better interior climate. Those aspects are part of architectural performance, directly influenced by the spatial organization of the building.

Berlin
The context chosen for this studio is a city of Berlin, capital of Germany, where most of the German government buildings are concentrated. Generally, the government buildings in Berlin are not designed to accommodate specific functions of ministries, and they occupy recycled buildings. In the chosen case of the Foreign Office the ministry occupies the former Reisbank, built in 1937 that was later adapted as a ministry building in 1991.

Studio goal
Due to the growth of a data since and technological developments, buildings are becoming smarter. Now they are able to collect data about their users, adapt own climate for weather conditions and orientation of a sun. In other words, optimize their performance. Maybe the future government building would not need any hard data and storage facilities, and everything would be stored in a data cloud. Ministry workers would only need to download data they need from a server placed outside of Berlin borders, somewhere in the fields of Schönower Heide. By those means a building would need less spaces for certain services and more for those that enhanced by technological development. The goal of this research is to investigate the evolution of those spaces and understand how they could affect architectural aesthetics and performance in the era of data driven technologies. Questioning if the servant space could become again a part of architectural aesthetics as it was during the period of High Tech but in more advanced, data-based way.

At the same time data analyses allowed buildings to become quicker, more comfortable, easier to repair and better rentable. Therefore, future design approaches could become closer to a product design, where delivered quality and functional usability are the key elements. The other goal of this research is to investigate in which scale building should be as uniform as product design aims to be.

From the title of this research plan follows personal intention to inventory servant spaces and see how it developed through time in the buildings and draw preliminary conclusions on the future developments.

Glossary

Served space – primary areas
Concert halls, commercial spaces, living rooms, bedrooms, auditoriums, classes, and exhibition spaces and etc.

Servant space – space that supports the main areas of the building corridors, stairs, elevators, toilets, storage rooms, changing rooms, technical rooms or interstitial spaces including facilities such as:

- Water Systems
- Heating Systems
- Ventilation Systems
- Air Conditioning
- Sewage
- Gas Installation
- Electrical Supply and Installations
- Fire Prevention and Control Services
- Security Installations
- Alternative and Renewable Energy Systems

Interstitial space – intermediate space located between regular-use floors, commonly located in hospitals and laboratory-type buildings to allow space for the mechanical systems of the building.
Mechanical servicing – all services in a building or facility that involve motors, machines, or the flow of fluids usually in conjunction with electrical or electromechanical controls

Architectural performance – the way in which building acts, offering its primarily function and expresses inserted architectural ideology.

Data driven design – decision - making approach to the design process that heavily relies on collected data about customers' behavior and attitude
Smart building – building that involves the installation and use of advanced and integrated building technology systems

Research question

How is servant space evolving in the public building to increase architectural performance?

Sub-questions

1. What kind of servant space makes building generic or specific?
2. Does less servant space mean les architectural performance?
3. What is servant space in the era of data driven design?

Theoretical framework

Universal building / building as product design / flexibility

The context chosen for the Complex Projects graduation studio is a city of Berlin, where I am personally interested in the typology of a government building: Ministry of Foreign affairs of the Federal Republic of Germany (Auswärtiges Amt). During the 20th century government building as well as other types of the buildings in Berlin had undergone many changes due to the World War II and its consequences. After the 1945 many of Germans government buildings moved to the Bonn and after the decay of Soviet Regime in Eastern part of a Germany they were placed back in the capital of the Federal Republic. Approximately 90% of ministry buildings in Berlin (approximate number, will be specified) are occupying buildings that were not initially designed to accommodate new functions and services that would not allow new building to perform satisfactorily.

But all over the world there are plenty examples of the buildings that have been recycled and the new functions seem to serve their users better in presence of contemporary brand-new efforts to design and construct a building that would supposedly follow and express its function. In Great Britain the best concert hall may be a recycled brewery - now known as the Snape Maltings in Suffolk. In Baltimore the best art school may be a recycled railroad station - the Maryland Institute, College of Art (Blake, 1978). There are many other examples including the Architecture faculty building of TU Delft in the Netherlands that occupies the former Thechnishe Hogeschool that was built for a faculty of Chemistry in 1920 and it seems to serve a new function quite well.

On the contrary, it is relatively obvious that those examples are limited in the new functions that they could have accommodated. The future function of the building is clearly unpredictable. So, a question arises of the necessity to design a building so flexible that they would be able to accommodate and welcome all conceivable functions in years and generations to come (Blake, 1978). It could mean that the building would be designed without letting main spaces interfere with all the services that building would accommodate. Vertical plumbing, ventilation and heating systems, wet areas, circulation halls and other servant spaces would be removed from the main space to let anything from a school to a factory be constricted at some unpredictable future time (Blake, 1978).

Mies van der Rohe's concept of a "universal space" could enclose those features quit well. "Universal space" - is a structure capable to accept almost any kind of function, from city hall to automobile showroom. But there are some problems and time bombs that could be distinguished. The main problem is that the infinitely flexible buildings tend to be extremely expensive in construction. The mechanical services that could allow building to be transformed from one to another function would probably cost at least two or three times as much as building two separate buildings (Blake, 1978).

But talking about flexibility it is inconvenient to design an expensive structure that could accommodate one performance and then another. Although in the scope "one" performance that could be adjusted or improved over time and the idea of "universal building" would perform in that case better. Taking the example of laboratory or hospital buildings where it is necessary to build open spaces with less possible column interaction and interstitial floors (between usable floors) to accommodate all the necessary services and allow them to be flexible for any future requirements.

The aim of this research is to investigate in which scale servant spaces of the building should be flexible for possible future changes. What kind of spatial organizations could be most efficient for new technological requirements dealing with advancements in a data science in public building.

Effect of servant space on architectural performance

It is important to understand how buildings performed and took shape through the time of 20th and 21st century. This period is hosen because the primary economic and programmatic formulas for quality of a public space in a building were standardized.

The example of New York and Chicago from the book "Forms follow finance" by Carol Willis could clearly characterize how building perform due to technological developments. By describing skyscrapers, the ideas of a spatial organization could be applicable for other public typologies.

The periodization of time is divided at the period before 1940s and after, and it is based on different factors. The earlier phase where buildings were necessary connected to the place and environment. In this period interiors of the building depended principally on the sunlight and illumination. Buildings wexre occupying the boundaries of their lots in way that became irrelevant after the introduction of fluorescent lighting and air conditioning. The period after 1940s could be described as phase where building shape was less connected to the site and environment (Willis, 1995). It means that technological developments of services that building could offer and accommodate made buildings independent from one site to another one. The invention of air-conditioning and fluorescent lighting could make windows of the building smaller or give it different shape because they would not need to illuminate interiors or be opened, floors would not need to be as high as they were, and the building could include more stories within the zoning envelope. Also, the depth of office spaces from the window to the innermost wall or public corridor had to be from 6 to 8,5 meters before the introduction of fluorescent lightning. After 1940s fluorescent lighting and air conditioning were services that were considered as important as elevators and steel cage constructions were for the buildings of the late 19th century. The was no necessity to use courts in the center of the building to provide extra light and all interior space could be completely exploited. It resulted to almost 80% of a space in the building becoming rentable, in comparison with 65% that were common twenty years earlier (Willis, 1995).

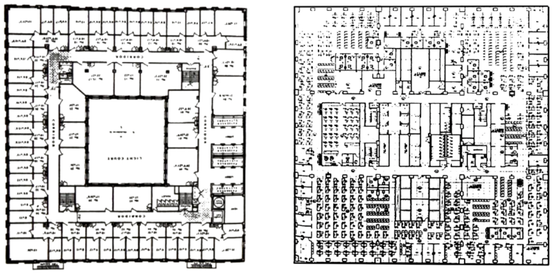


Fig. 1: Difference in the floorplans before and after 1940

Although, shape of those buildings unfortunately could not often directly tell anything about technical developments, express structure or material what was used. If we will have look at the two of the most important icons of modernist architecture from that time, Mies's Barcelona Pavilion and Corbusier's Villa Savoye, we have no idea how they are constructed or how major part of their structures work. And for the most part we have even less of a sense of how mechanical (heating, ventilation , air conditioning or plumbing) works in much of a modern architecture, as it often hidden in the building core or above hung ceilings (Lobell, 2020).On the contrary, some architects including Louis Kahn tend to express both structure and mechanical in many of theirs buildings. While the mechanical ducts and fire stairs are hidden in the core of the Seagram Building, Kahn - following the Frenk Lloyd Wright in the Larkin Building - pulls some of them to the outside of Richards (laboratory), giving them full expression.

Kahn wants to avoid hiding the mechanical under a hung ceiling. He stated that such a ceiling would hide the honest expression of the making and working of a building. As in Richards, Kahn wanted to keep the centers of a pavilions clear and he wants to express the mechanicals, so he provides a separate major service block with air ducts articulated on the back, and he placed the exhaust air ducts and fire stairs in slim service towers on the side of each pavilion. Noting the distinction of the air exhaust towers from the fire stairs towers by unpredictable difference

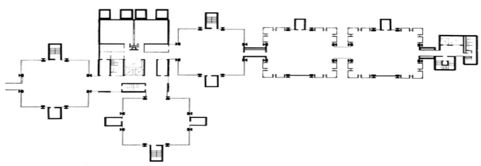


Fig. 2: Richards Medical Laboratories, Louis Kahn

With this strong articulation of mechanical services, the building is a diagram of its breathing prosses. Richards Medical Research Laboratories with its clear expression of serves equipment influenced numbers of buildings for years to come. We can see that the organization of a Kahn's Sulk institute laboratories with a large open space spanned by the huge Vierendeels that cantilever to hold hallways and Pompidou Center of 1971 - 1977 in Paris by Piano and Rogers has fundamentally similar organization. We can see the link Salk to Pompidou and then from Pompidou to a whole series of buildings that boldly express their structure and their mechanical, including Norman Foster's Jong Kong and Shanghai Bank of 1979 - 1985 and Richard Rogers Lloyds Building of 1978 - 1986 in London (Lobell, 2020).

Following this sequence of buildings, this research aims to investigate how servant space evolve and affect architectural performance of the buildings described above by means of inventory and tracing of servant spaces, they accommodate. Later in the research process I aim to supplement the list of building with more recent examples to draw link towards contemporary architecture.

Servant space in the era of data driven design

By the late 1970s the new aesthetics and ideology of a postmodernism started to predominate in architecture. At the same time computer technology created a new demand for a spatial programming of a buildings and "smart buildings" were preferably chosen because of advanced electronics, application of sensors, better climate performance, higher security level and other integral, smart systems. Computer controlled "smart buildings" might indicate the architecture's next engagement with a high technological performance. Modern financial system is entirely reliant on a high speed, global ICT infrastructure. Agriculture and manufacturing are both heavily automated, having moved far beyond the machinery of the first industrial revolution. Medicine depends on a high resolution imagining, electronic medical records, big data analyses and increasingly on robotic methods in the surgery suit. (Bernstein, 2018). Government buildings, where quite a lot of hard data storage and archives are still predominating and could be substitute with an internet data clouds and the interior space within zoning envelope could be organized on a more efficient, integrated, or smarter way.

That part of the research meant to determine the position of a servant space in era of data driven design and its influence on architectural performance. Trying to understand whether servant space could become a part of new aesthetics as it was during High Tech architecture, or it is destined to be optimized and hidden.

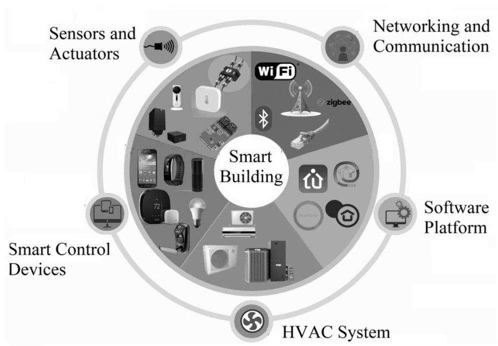


Fig. 3: characteristics of smart building

Methodology

Research consists of one overarching theme, servant space and its influence on architectural performance. This theme is further subdivided in three sub-themes "Building as product design",
"Effect of servant space on architectural performance" and "servant space in the era of data driven design".

Methods to be used in this research could be distinguished in three groups:

- literature research
- Case studies
- Inventory

First of all, literary analysis will be held to gather theoretical bases for notions that deal with a technical equipment, services, and spaces that buildings could offer. It is meant to clarify the architectural ideology behind technical developments and understand why technical decision were made.

Secondly, study of precedents will be used to formulate the clear understanding of how servant space evolved though the time. It would be done by the means of analyzing and tracing plans and categorizing building services. Main precedents of the modernist and High-Tech architecture would be used for investigations, namely: Larkin Administration Building from from 1906 by Frank Lloyd Wright; Richards Medical Research Laboratories from 1960 by Louis Kahn; Salk Institute for Biological Studies from 1962 by Louis Kahn; Centre Georges Pompidou from 1977 Renzo Piano and Richard Rogers. Later in the research process I aim to supplement the list of building with more recent examples to draw link to contemporary architecture.

Finally, Inventory will include categorization of servant space and its evolution though time regarding public buildings. Per category there would be researched how those services could be affected by the data driven technological innovations. This method would be used to investigate the possibilities for a design proposal of a new Ministry building.

Larkin Administration Building
Frank Lloyd Wright
1906

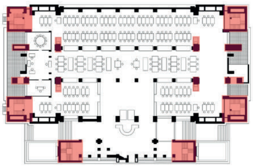
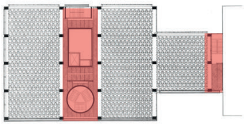
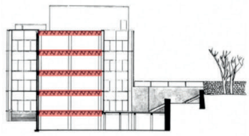
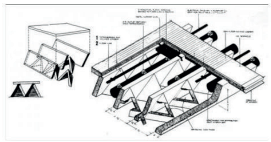
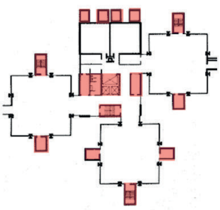
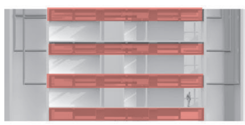
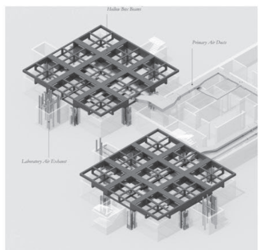
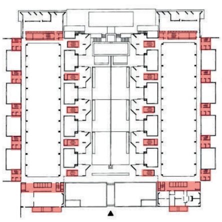
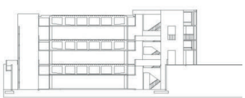
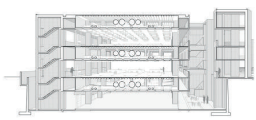
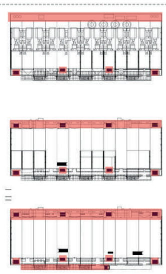
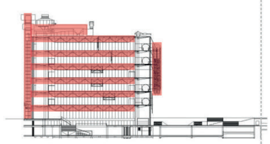
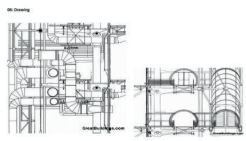
Yale University Art Gallery
Louis Kahn
1953

Seagram Building
Ludwig Mies van der Rohe
1958

Salk Institute
Louis Kahn
1962

Richards Medical Research Laboratories
Louis Kahn
1960

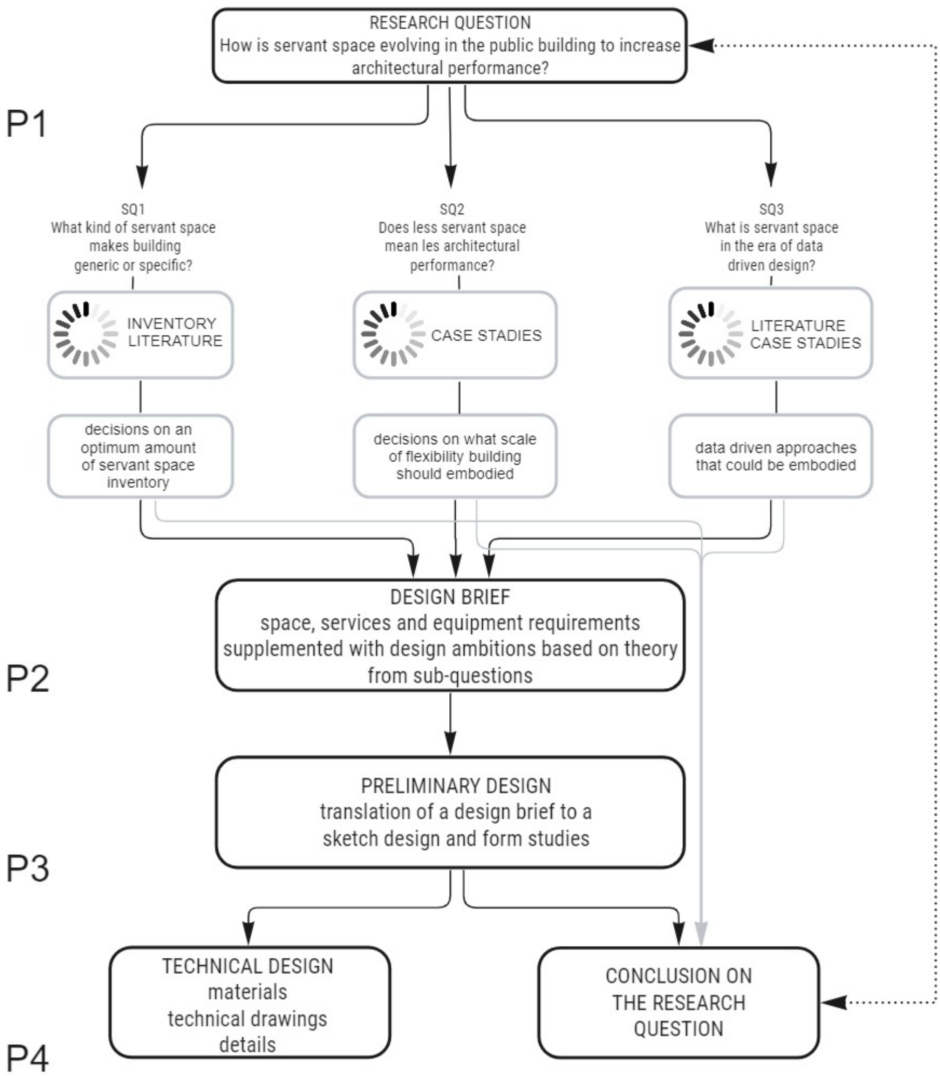
Centre Pompidou
Renzo Piano, Richard Rogers
1977

Building inventory	Vertical space	Horizontal space	Specification
		not specified or integrated	not specified or integrated
			
		not specified or integrated	not specified or integrated
			
			
			

Conclusion

This research ambitions to clarify the building structure for a new government building from the perspective of possible future flexibility. In conclusion, the research aims to investigate the possible design solutions for a servant space of a ministry building according to the new technological developments in a data science, emphasizing advancements in electronics and sensors, better climate performance, higher security level and other integral, smart systems. In addition, the catalogue with servant space categorizations aimed to be made to support the design process with an insight to the past and contemporary design solutions.

Research plan



BIBLIOGRAPHY

02

Banham, R. (1984). Architecture of the Well-Tempered Environment (2de editie). Amsterdam University Press.

Bernstein, P. G. (2018). Architecture / Design / Data. De Gruyter.

Blake, P. (1978). Form Follows Fiasco: Why Modern Architecture Hasn't Worked. Little Brown & Co.

Francesco, C. (2016). The Wall as Living Place Hollow Structural Forms in Louis Kahn's Work / anglais. LETTERAVENTIDUE.

Gannon, T. (2017). Reyner Banham and the Paradoxes of High Tech. Getty Research Institute.

Koolhaas, R. (1997). Delirious New York. Amsterdam University Press.

Lobell, J. (2020). Louis Kahn. Amsterdam University Press.

Willis, C. (1995). Form Follows Finance. Amsterdam University Press.

Fig.1 [Floor plan development through time]. (z.d.). https://archive.org/details/formfollowsfinan0000will/page/150/mode/2up

Fig.2 [Richards Medical Research Laboratories Louis Kahn 1960 - plan]. (z.d.). https://hiddenarchitecture.tumblr.com/image/178225960555

Fig.3 [Snart building diagram]. (z.d.). https://www.researchgate.net/publication/334286607_Leveraging_Machine_Learning_and_Big_Data_for_Smart_Buildings_A_Comprehensive_Survey/figures?lo=1&utm_source=google&utm_medium=organic