ARCH 121 – INTRODUCTION TO ARCHITECTURE I
WEEK 13: Function in Architecture
From: Roth, L., Understanding Architecture: Its Elements, History and Meaning

1. Function in Architecture

As described by Vitruvius in 25 BC, architecture should reach to an optimum combination of *firmitas, utilitas* and *venustas*, meaning firmness, functionality and beauty. Functionality meant the arrangement of rooms and spaces so that there is no difficulty to the use of building and so that a building is perfectly suited to its site. Firmness meant that foundations were solid and that the materials of the building well selected. Beauty meant that the appearance of the work is pleasing and in good taste. This Vitruvian triad is still a valid summary of the elements of good architecture.

Therefore, the ultimate test of architecture is made by asking these questions:

1. Does the building function well and is it suitable for its site? (functionality)
2. Is the building built well enough to stand up and are its materials durable? (firmness)
3. Does the building appeal to senses?

In this lecture, we shall look at the first condition of architecture, which is function. Function, or the pragmatic utility of an object/work of architecture, says that the object/work of architecture is fitted to a particular use.

2. Function and Form in Architecture

We had said before that architecture is the art of playing with forms (solids) and spaces (cavities). Some architects start their designs by playing with forms (solids) and some of them start by playing with spaces (cavities). However, for the creation of a good architectural product, both of them are necessary. Great architects play with them at the same time.

Likewise, and very relatedly, some architects start their designs by thinking about the formal appearance of the building and some of them start by thinking about the functional operation of the building. However, again, for the creation of a good architectural product, both of them are necessary. Great architects think about both of them (form and function) at the same time.

The form in architecture differentiates according to the function and structure of the building; and structure and function is determined by the form.

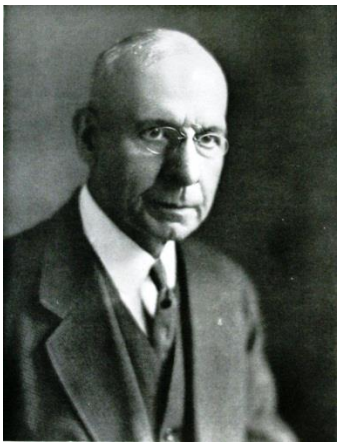
2.a. Form Following Function

As we have said some forms are created by thinking about the functional operation of the building. They are shaped according to the internal activities or purpose of the building. Such forms tend to be more practical. This category of design development is described as ‘form following function’.

‘Form follows function’ was a phrase developed by American architect Louis Sullivan. It meant that the form of any building should be defined by the activities/functions that were to be carried out inside it, rather than any historical precedent (example) or aesthetic ideal. It implied that decorative elements, which are called as ‘ornaments’, were needless in buildings. The phrase became the motto of Modernist architects after the 1920s.

Sullivan designed the world’s first skyscrapers using these functionalist design principles. His approach was concerned with form following function and the buildings he produced were driven by functional necessity.

The concept of functionalism was further developed by Austrian architect Adolf Loos. He wrote as ‘ornament is crime’, and argued that any decoration on a building was both superfluous and unnecessary. The thinking of both architects created new and modern responses to architectural design.



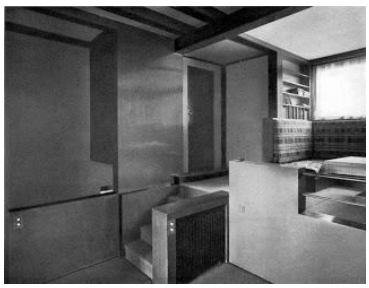
Louis Sullivan

Wainwright Building (left) and Guaranty Building (right) by Louis Sullivan

Adolf Loos


Adolf Loos: Muller House, Prague, Czech Republic


Adolf Loos: Muller House, Prague, Czech Republic



Adolf Loos: Muller House, Prague, Czech Republic

Adolf Loos: Rufer House, Vienna, Austria

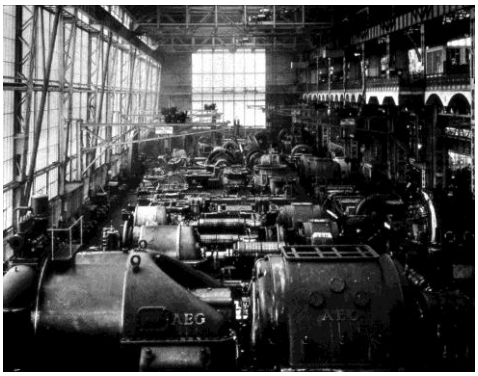
The Modernists adopted both of these phrases—"form follows function" and "ornament is crime"—as moral principles, and they have seen industrial objects, machines and factories as brilliant and beautiful examples of plain, simple design integrity.

Modernist architecture first arose around 1900 and primarily sought for the primacy of function in architecture, the simplification of form and the elimination of ornament. It said that the forms should be shaped as a result of the functions of the buildings, instead of by traditional aesthetic concepts. Therefore modernist architecture adopted 'functionalism' in architecture, which is a principle saying that architects should design a building based on the purpose of that building. The *zeitgeist* (*spirit of the age or spirit of the time*) of modernism influenced architecture, art, and fashion of the 20th century.

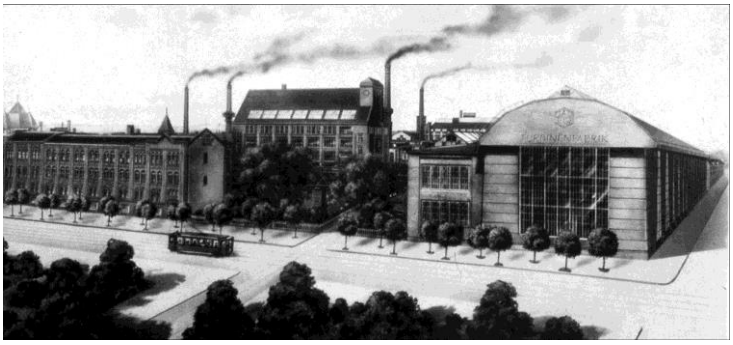
Modernists were inspired by industrial objects, machines and factories, since they were designed by function in mind. They presumed that buildings should also work like good working machines and developed a concept called 'machine aesthetics' to describe the formal understanding of such buildings. They have attempted to have such a machine aesthetics in their own buildings.

Machine aesthetics

The first examples of this type of architecture were the AEG Turbine Factory, Berlin, 1908-09 by Peter Behrens and Fagus factory by Walter Gropius in Germany. In both of these, the form of the building was determined totally by the internal industrial processes that the building contained. In 1926, The Bauhaus school built in Dessau also demonstrated this principle in its workshop wing.

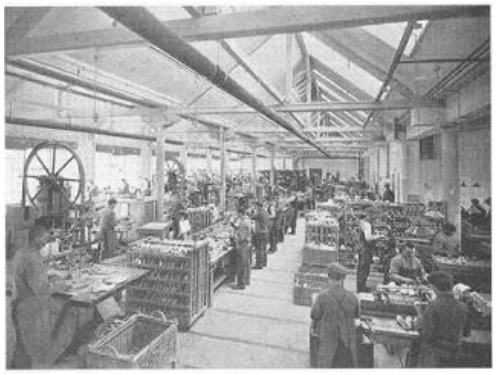



AEG Turbine Factory, Germany, Industrial architecture

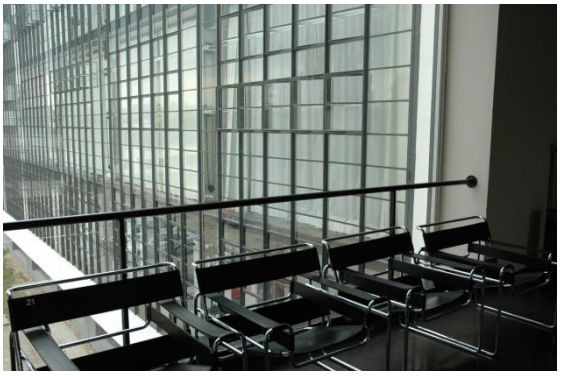


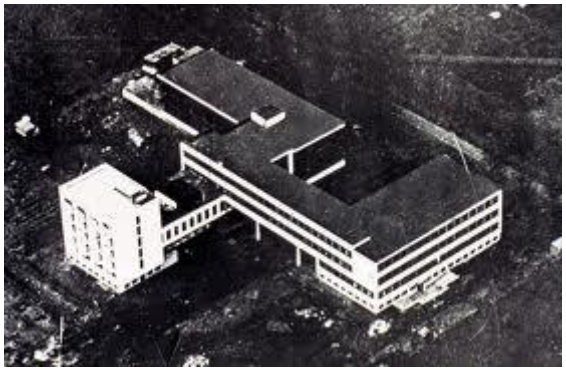

AEG Turbine Factory, Germany, Industrial architecture


Fagus factory by Walter Gropius in Germany

Fagus factory by Walter Gropius in Germany





The Bauhaus Dessau

By the 1920s the most important figures of modern architecture had established their reputations. The three ‘founders’ are commonly recognized as Le Corbusier in France, and

Ludwig Mies van der Rohe and Walter Gropius in Germany. By the 1940s modernism became the dominant architectural style throughout the world.

Le Corbusier (one of the founders of Modern architecture) stated that the new age demanded a new house and he said that "the house is a machine for living in".

Ludwig Mies van der Rohe's famous phrase is "Less is more".

Walter Gropius

Louis Sullivan, the owner of the inspirational phrase of Modern architecture "form follows function", designed the first skyscrapers of the world toward the end of 19th century. He developed the shape of the tall steel skyscraper in late 19th century when the technology, taste and economic forces at the time made it necessary to drop the traditional styles of the past. If the shape of the building wasn't going to be designed according to traditional styles, something had to determine form, and according to Sullivan it was going to be the purpose/function of the building. Like this he developed the idea "form follows function".

To design his skyscrapers he first examined what they would enclose and found that there were 4 distinct zones, which were: (1) basement that contained the machinery and storage, (2)

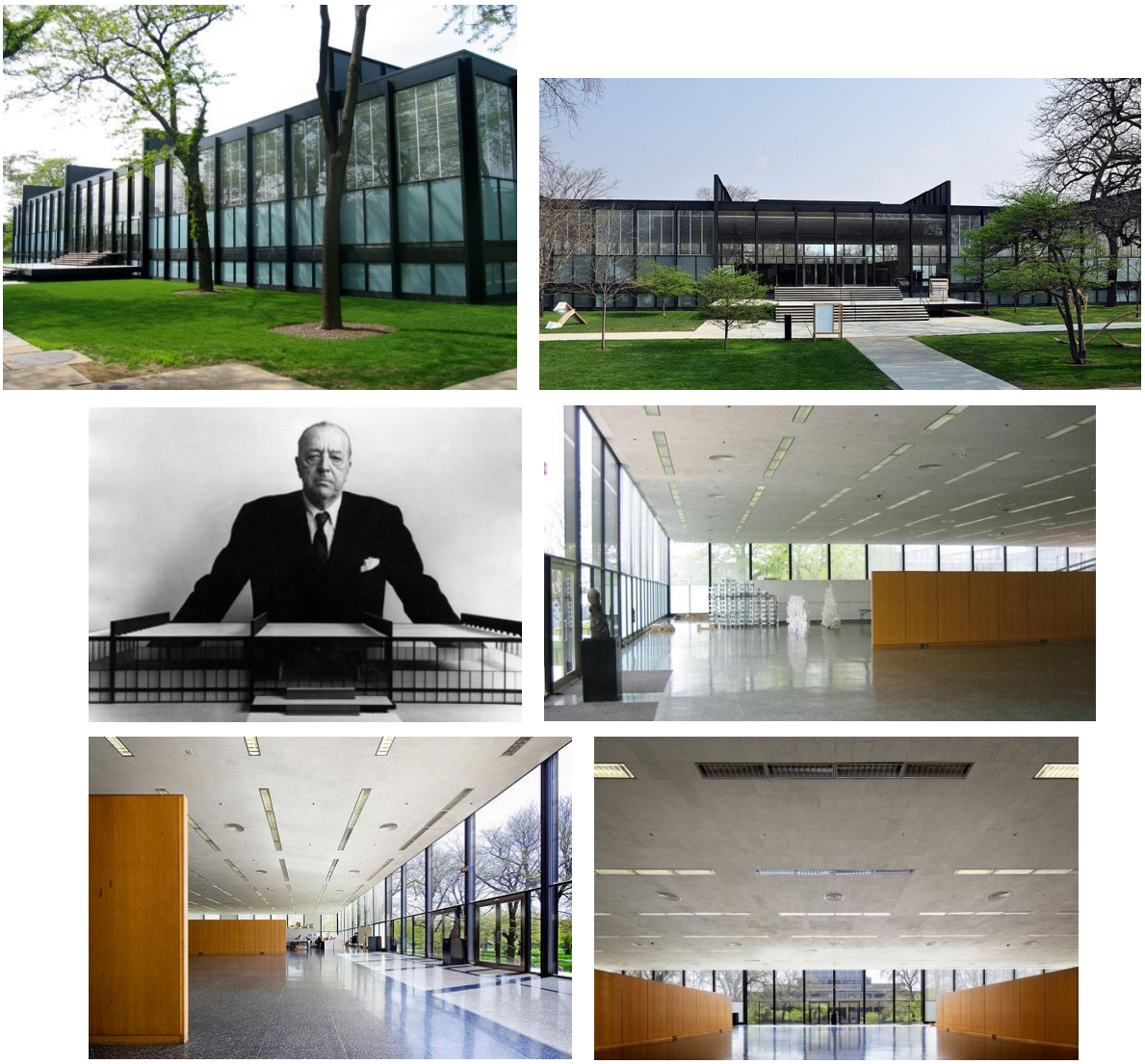
ground floor that contained the entrances, the elevator lobby, and the shops at the street sides, (3) the central section that contained the office cells arranged around the elevator, and (4) the upper floor that contained the elevator machinery, water tanks and storage. Sullivan argued that the vertical form of the building should express each of these functions (3 above the ground). The example to it is Guaranty Building in Buffalo, NY (1894).

The Guaranty Building (now called the Prudential Building), designed by Louis Sullivan and Dankmar Adler, in Buffalo, New York (1894). The three zones of Sullivan's design are visible in the large open windows of the ground zone, the thin vertical elements of the office zone and the arches and curves of the terminating zone at the top of the building.

Another architect that expressed the function through the form was the Finnish Architect Alvar Aalto. In the Library for the Benedictine Monastery at Oregon (1967-71), he designed each space in the best way to accommodate its use, placed them where they ideally need to be, and joined them to form a harmonious whole. When looked from the exterior you can understand the function of each space: the fan shaped reading rooms fan out from the circulation zone, rectilinear office rooms and a wedge shaped auditorium.

Library for the Benedictine Monastery at Oregon (1967-71) by Alvar Aalto.

Another approach to functionalism was to give the forms flexibility so that they would be able to house different and changing functions. Mies van der Rohe was the architect who championed this view. Rohe's IIT Crown Hall Building is a demonstration of this idea. The huge single room is designed flexibly to contain any function. Rohe stated that he did not fit form to function but created a flexible form to house any function.



Rohe's IIT Crown Hall Building

Lastly however, it should be said that architecture and life in buildings are not that mechanical. Architecture is more than functional utility or structural display- it is the container that shapes human life. The architect Louis Kahn explained this very well: "when you make a building, you make a life. It comes out of life, and you really make a life. It talks to you. When you have only the comprehension of function of a building, it would not become an environment of a life."

2.b. Function Following Form

We had said before that, some forms are created by the external appearance of the building in mind. Such forms tend to be more sculptural. This category of design development is

described as ‘function following form’. However, this kind of thinking in architecture (thinking about only form in architecture design) is missing, because as we have said, a good architect should think of both the form and the function at the same time.

The modernist functionalism, which saw the function of a building affect its final shape and form, produced a reaction, which dictated that function follows form; that the shape of a building should be the architect’s primary consideration, and any functions and activities that the building is to house should be accommodated into this form.

One of the earliest architects who embraced the ideals of this kind of an architecture was Antoni Gaudí; his most famous work, La Sagrada Familia, or the Parc Güell (both in Barcelona, Spain) use forms in a sculptural way to great dynamic effect. La Sagrada Familia is extremely ornamental and decorative. It looks like it has been sculpted rather than built and its stones appear almost liquid-like and display a light, open quality.

La Sagrada Familia, Barcelona, Spain Antoni Gaudí, still to be completed





Parc Güell, by Antoni Gaudi, in Barcelona, Spain

Sculptural-formal architecture is also exemplified by the work of Frank Gehry. Gehry's architecture uses the form primarily to determine the building; its materiality and shape are the main considerations. This design approach requires all the activities of a building to be fitted into the dramatic shape or form.


Frederick R. Weisman Art Museum, Minneapolis, US Frank Gehry, 1993

This museum is a great example of function following form. Gehry's architecture uses the form primarily to determine the building; its materiality and shape are the main considerations.

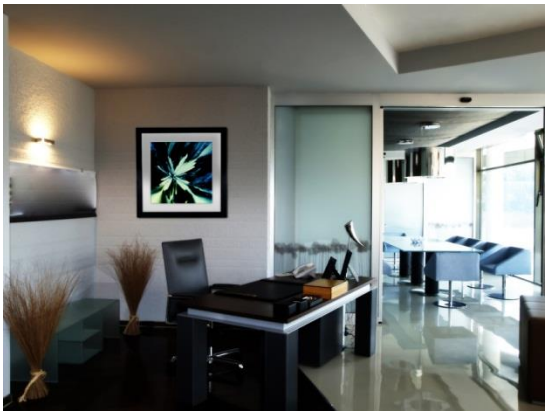

Frank Gehry and the Guggenheim Museum in Bilbao, Spain


Walt Disney Concert Hall, USA (left) and Dancing House in Prague

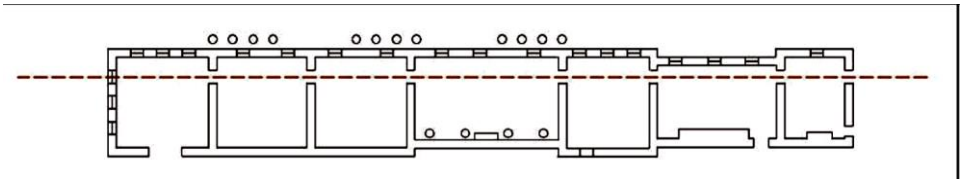
3. Types of Function in Architecture:

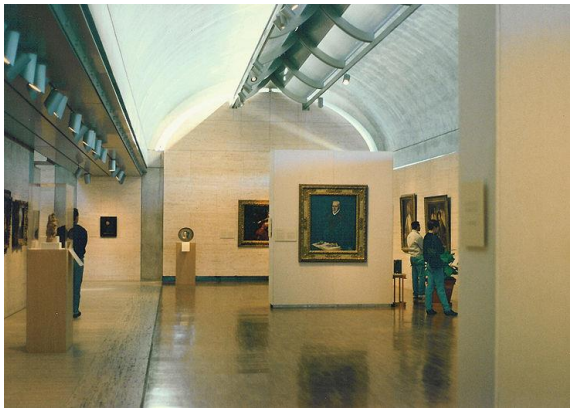
There are different types of function in architecture:

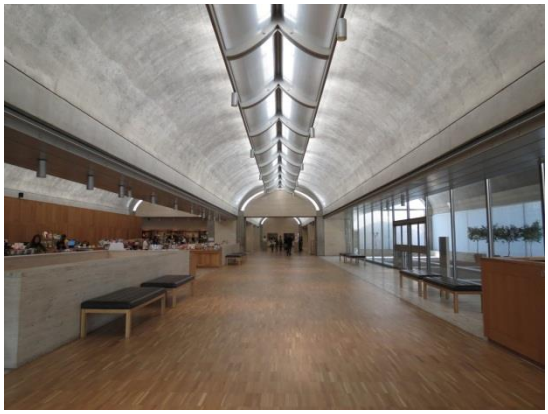
1. **Pragmatic function**: Accommodation of a specific use in a room or space. (for example, a room might be used to contain a single bed for sleeping or it might be an office cell containing a desk)



2. **Circulatory function**: The making of appropriate spaces to direct movement form area to area. Most buildings contain numerous rooms with interrelated functions. People, naturally, need to move from one space to another. Therefore, the circulatory function should also be satisfied well.
   In some buildings, such as museums and galleries, this route may be designed as part of the architectural concept. The route through these buildings might allow, in this instance, the art or artifacts to be better understood and experienced.







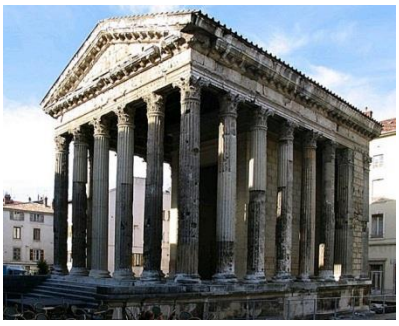
Kimbell Art Museum by Louis Kahn

An example to the thought of circulatory function is Charles Garnier's Paris Opera (1861-75). Garnier has analyzed people's thoughts about the Opera and found out that they are also going there to see other people and be seen by them, next to listening to the operas. So he has carefully designed the circulatory spaces (the foyer, the waiting room and stairs) to let people see other people and be seen.

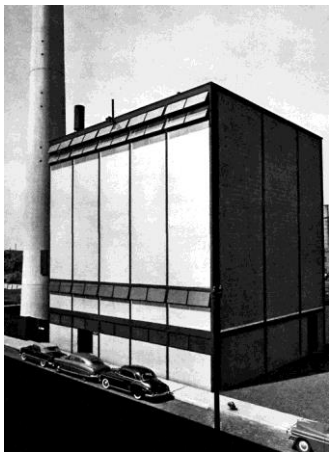
Charles Garnier's Paris Opera (1861-75) and its grand foyer


The grand staircase

3. **Symbolic function:** A building has also a symbolic function and demonstrates its use by its exterior view. We usually expect a correspondence between buildings appearance and its use. In the past (among the Romans, Egyptians or Greeks) there were rules that describe the appearances of buildings for certain uses, but nowadays we don't have such rules.




Starting with the Modern Movement in architecture roughly by 1920's (Modernism), buildings started to tell us almost nothing about what goes on inside them. For example, Mies van der Rohe's two buildings in Illinois Institute of Technology campus, look similar in terms of their architectural language and materials, but one of them is the Boiler House and the other is a church. They don't tell us how their function differs.



Mies van der Rohe's Boiler Plant in Illinois Institute of Technology

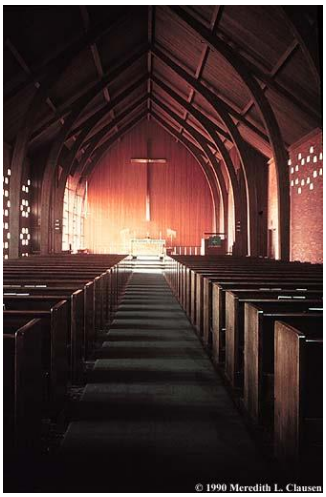

Mies van der Rohe's Boiler Plant in Illinois Institute of Technology, Chicago, Illinois (1949-52)




Mies van der Rohe's Carr Memorial Chapel, Illinois Institute of Technology, Chicago, Illinois (1949-52)

Mies van der Rohe's Carr Memorial Chapel, Illinois Institute of Technology, Chicago, Illinois (1949-52)

However, for example, Zion Lutheran Church in Portland, Oregon, 1950, by Pietro Belluschi, shows the functional character of a religious building without imitating or recreating the Gothic churches.



Zion Lutheran Church Portland, Oregon, Pietro Belluschi: The image of church is created by the simple use of colored glass and arches in wood; without imitating the traditional churches.

The United States National Capitol Building in Washington (1830) has established an 'image of government' in United States. From then on the new government or capitol buildings in other places were built using its Neoclassical image (one example is Minnesota State Capitol Building).

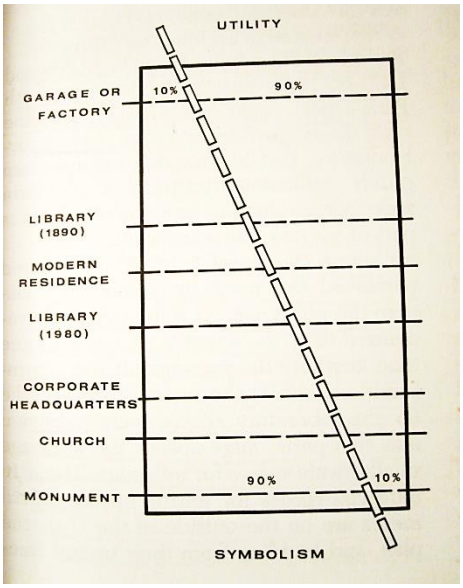
United States National Capitol Building in Washington (1830)

Minnesota State Capitol Building, 1905.

Another architectural example that gives the signs of its function is Eero Saarinen's TWA Airport Building in New York (1956). By its specific architectural language, the building conveys symbolically the sensation of flight. The great concrete shells of the building look like giant wings. The form alone prepares us for the action of flight.


Eero Saarinen's TWA Airport Building in New York (1956).

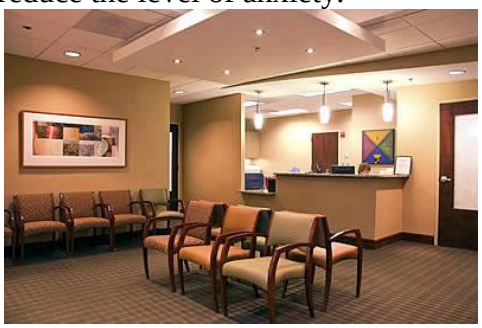
However, every building contains a mixture of functions: pragmatic, circulatory, symbolic or psychological. A garage may contain %10 symbolic function and % 90 pragmatic function, whereas a monument may contain %10 pragmatic function and % 90 symbolic function. There are also buildings that may contain them half and half, such as a library.



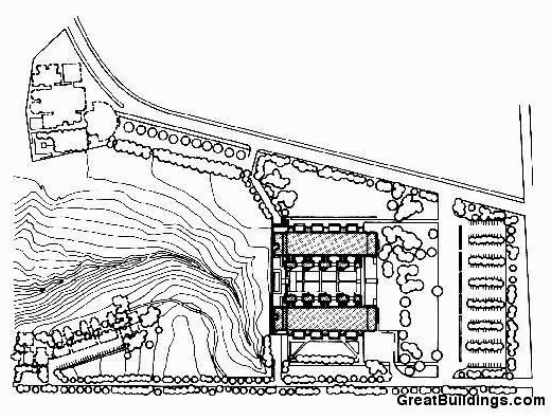

Symbolic function: White House in Washington (left), Buckingham Palace in London (right)

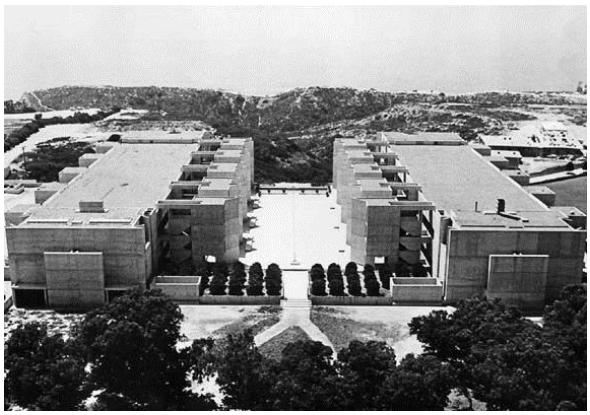

Symbolic function: Sydney Opera House (left) and the Eiffel Tower (right)

4. **Psychological function:** Good architecture has also physiological and psychological functions to fulfill. For example, a waiting room in a doctor's office or a hospital emergency room are the places where people feel heightened levels of anxiety. An architect might determine that creating a domestic environment there or to give a view of garden would help to reduce the level of anxiety.



In Salk Institute for example by Louis Kahn, the architect have consulted the scientists and the owner of the land Jonas Salk, who himself was a scientist, and found out that the scientists needed big work areas and laboratories that have purely utilitarian functions and also small, quiet and private spaces for them to think alone. By holding these in mind, he designed large spaces for conducting experiments and small private offices for individual use, which look at the ocean.



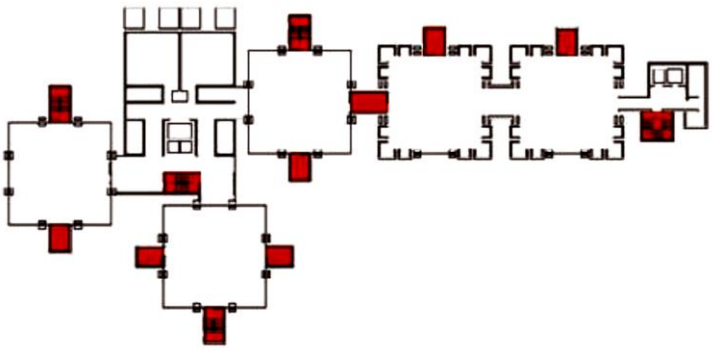


Salk Institute by Louis Kahn

Salk Institute by Louis Kahn

Another one of Louis Kahn's principal ideas about the function of the building was the distinction between 'served' and 'servant' spaces. Servant spaces have functional use, such as storage rooms, bathrooms or kitchens – the spaces that are essential for a building to function properly. Served spaces might be living or dining rooms or offices – spaces that the servant areas serve.

The Richards Medical Centre in Philadelphia, US, exemplifies this ideal. The glass-walled workrooms are 'served' by separate, freestanding brick chimneys. Each 'served' space has an independent structural frame with a complete set of supports and its own source of natural illumination.

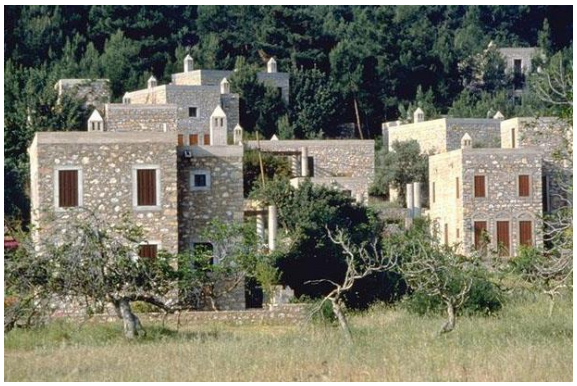


Plan of Richards Medical Centre Philadelphia by Louis Kahn




Plan of Richards Medical Centre Philadelphia by Louis Kahn

5. **Cultural and contextual function:** Function is also socially and culturally influenced and a building's form is also a response to its physical setting and climate. Every building has the responsibility to respect and to be in harmony with its context/environment. The building has to answer to the *genius loci* **(**spirit of the place- a location's distinctive atmosphere) of that place.




Turgut Cansever – Demir Holiday Village in Bodrum