Analysing the Iterative Nature of Architectural Design & It's Evolution

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'ANALYSING THE ITERATIVE NATURE OF ARCHITECTURAL DESIGN AND IT'S EVOLUTION'

ABSTRACT

This dissertation embarks on a multidimensional exploration of the iterative nature of architectural design. Drawing inspiration from George Kubler's seminal work, "The Shape of Time." Kubler's profound insights into the evolution of human-made objects through time serve as a foundational framework for understanding the dynamic trajectory of architectural design across civilizations and eras.

At the heart of Kubler's exploration lies the concept of a "system," which he defines as a dynamic set of interrelated elements operating within a cultural context. Within this system, Kubler identifies "prime objects" — foundational elements that embody the essential characteristics and values of a particular cultural tradition. These prime objects serve as the basis for successive iterations in architectural design, undergoing gradual modifications and adaptations to suit the evolving needs, technologies, and cultural aspirations of their time. (Kubler, 2008)

Building upon Kubler's framework, this dissertation endeavors to unravel the intricate patterns and influences that have shaped architectural design from antiquity to the present day. Employing a multidisciplinary approach that draws on architectural history, sociology, technology, and cultural studies, we trace the trajectory of architectural evolution through a comprehensive review of case studies from various periods and regions.

The primary objective of this research is to study the evolution of architectural design as an iterative phenomenon, understanding how societal, technological, and cultural factors have influenced architectural design decisions. By examining this iterative process in depth, we aim to create a kind of "algorithm" or formula that encapsulates the recurring trends and adaptations in architectural design.

Through this exploration, we hope to offer a fresh perspective on how architecture has evolved over the centuries and how it may continue to evolve, providing valuable guidance for architects and designers as they embark on the journey of shaping our built environment for generations to come. Ultimately, this research aspires to not only provide a thorough understanding of architectural evolution but also to offer insights into the future of architecture, contributing to the ongoing dialogue on sustainable, culturally relevant, and technologically advanced architectural design.

KEYWORDS: ARCHITECTURAL EVOLUTION, ITERATION, ITERATIVE PROCESS, EVOLVING NEEDS

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2 INITIAL MOTIVATION

In the realm of architecture, the process of design and construction has continuously evolved to reflect the changing needs, aesthetics, and technologies of each era. From the majestic structures of ancient civilizations to the cutting-edge skyscrapers of the present day, architecture has gone through a remarkable iterative journey. This dissertation endeavors to delve into this evolutionary process, aiming to unearth the underlying patterns and influences that have driven architectural design from the past to the present and potentially into the future.

The primary objective of this research is to study the evolution of architectural design as an iterative phenomenon, where each new building can be viewed as an iteration of previous designs, with modifications and adaptations to suit the requirements and aspirations of its time. Due to the complexity of the design process most buildings owe something to precursors however much designers strive for originality This study seeks to identify and analyze these iterations, understanding how societal, technological, and cultural factors have influenced architectural design decisions. By examining this iterative process in depth, we aim to create a kind of “theoretical algorithm” that encapsulates the recurring trends and adaptations in architectural design.

The dissertation will employ a multi-disciplinary approach, drawing on architectural history, sociology, technology, and cultural studies. It will involve a comprehensive review of relevant case studies from various periods and regions, allowing us to trace the trajectory of architectural evolution over time. These case studies will serve as both input and output data points for the proposed architectural design “algorithm”, shedding light on the iterative design process.

Ultimately, this research aspires to not only provide a thorough understanding of architectural evolution but also to offer insights into the future of architecture. By using the historical data as a foundation, we aim to predict potential future building designs, suggesting how past iterations may be tweaked to meet the demands of the contemporary and future times. In doing so, we seek to contribute to the ongoing dialogue on sustainable, culturally relevant, and technologically advanced architectural design.

Through this exploration, we hope to offer a fresh perspective on how architecture has evolved over the centuries and how it may continue to evolve, providing valuable guidance for architects and designers as they embark on the journey of shaping our built environment for generations to come.

3 LITERATURE REVIEW

George Kubler's seminal work, "The Shape of Time," provides a foundational framework for this dissertation. Kubler's concept of a dynamic system, composed of interrelated elements within a cultural context, offers insights into the evolutionary trajectory of architectural design. This dissertation builds upon Kubler's ideas to unravel the intricate patterns and influences shaping architectural evolution across civilizations and eras.

"The Shape of Time," was motivated by a profound interest in understanding the evolution of human-made objects over time which also extends onto architecture. Kubler sought to unravel the dynamic trajectory of cultural artifacts, recognizing that formal problems in art and design outlive the lifetimes of individual creators, evolving through successive iterations across civilizations and epochs.

Kubler introduces several key ideas that form the foundation of his exploration. Kubler defines 'formal problems' as fundamental challenges or questions inherent in the artistic or design process. These problems persist over time, transcending individual contributions and evolving through successive iterations. They serve as catalysts for creative exploration and innovation, shaping the trajectory of artistic and architectural evolution. (Kubler, 2008)

Kubler distinguishes between 'open' and 'closed' series in the evolution of cultural artifacts. An 'open' series refers to a sequence of iterations characterized by continual innovation and adaptation, with each iteration leading to new possibilities and developments. In contrast, a 'closed' series signifies a sequence of iterations that culminates in a definitive solution or form, marking the end of its evolutionary trajectory. (Kubler, 2008)

Within the framework of cultural evolution, Kubler identifies 'prime objects' as foundational elements that embody the essential characteristics and values of a particular cultural tradition. These prime objects serve as benchmarks for successive iterations, influencing the direction of artistic and architectural development while retaining their significance across time. (Kubler, 2008)

Rather than focusing on individual masterpieces or exceptional works of art, Kubler emphasizes the importance of studying artistic production as a series of interconnected developments. He suggests that by analyzing the repetition and variation of forms across different cultures and time periods, we can gain a deeper understanding of the underlying processes of cultural change.

Building upon Kubler's framework, this dissertation endeavors to unravel the intricate patterns and influences that have shaped architectural design.

4 ITERATIONS & THEIR CLASSIFICATION

DEFINING ITERATION

In the context of this dissertation, iteration in architectural design is understood as a dynamic process whereby successive versions of designs are created, refined, and adapted over time. It embodies a cyclical journey of creation, evaluation, and refinement, where each iteration builds upon the foundations laid by its predecessors. Iteration in architectural design is not merely a repetition of the same ideas but rather a continual evolution, influenced by a myriad of factors including societal, technological, cultural, and environmental considerations.

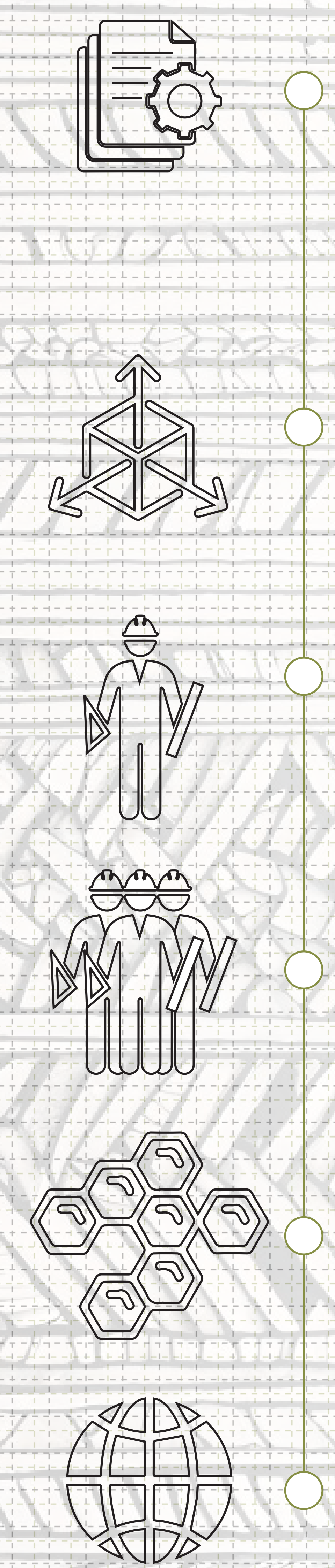
At its core, iteration encompasses the idea of incremental improvement and adaptation. It acknowledges that architectural design is not a static endeavor but a fluid and responsive one, constantly evolving in response to changing needs, aspirations, and constraints. Each iteration represents a step forward in the evolutionary trajectory of architectural design, embodying both continuity and innovation.

Within the framework of this dissertation, iteration is viewed through multiple lenses, each offering a unique perspective on the iterative process. These lenses, or classification strands, serve as strategic tools for navigating the complex landscape of architectural evolution, allowing for a comprehensive exploration of the iterative journey.

PROCESS OF CLASSIFICATION

In the pursuit of comprehending the nuanced layers of architectural iterations, this dissertation employs a carefully interpreted classification scheme to navigate the multifaceted landscape of design evolution. These classifications serve as strategic lenses, each offering a distinct perspective on the iterative journey of architectural creation.

Figure 1: Visual Representation of Interwoven Strands



PROFESSIONAL PROTOCOLS: Establishing the historical context of architectural iteration and the development of professional protocols within the discipline. This provides a foundational understanding of the iterative nature of architectural design and sets the stage for exploring specific strands of iteration. The Royal Institute of British Architects (RIBA) Plan of Work stands as a pragmatic guide, encapsulating the iterative approach to building design by outlining stages in a structured manner. This classification not only sheds light on the historical development of professional protocols but also underscores why an iterative methodology has become integral to architectural practice.

TEMPORAL DIMENSION OF ITERATION: Focusing on the extended gestation of projects, this classification challenges conventional notions of a fixed design and reveals the iterative nature of design development over time, highlighting the evolution of architectural ideas across temporal scales. This classification unveils the dynamic evolution of a single architectural project over time.

INDIVIDUAL ARCHITECT'S ITERATION: This strand offers a granular examination of serial iterations within their works, providing insights into the evolution of formal languages and problem-solving approaches over time.

COLLECTIVE CONTRIBUTIONS AND SCHOOLS OF THOUGHT: Transition to an exploration of collective contributions and schools of thought within architecture. This strand elucidates how groups of architects iteratively explore shared design territories, shaping and redefining architectural discourse through collaborative endeavors.

MODULAR ITERATION: Shifting the focus, examining the refinement of singular architectural elements through successive iterations, this strand emphasizes the iterative evolution of specific design components, elucidating how incremental improvements contribute to overall design refinement.

GEOGRAPHICAL & ASTRONOMICAL ITERATIONS: Introducing a cosmic dimension to the study. This classification demonstrates how architectural iterations are influenced by celestial geometries and geographic constraints, expanding the scope of architectural iteration beyond earthly realms.

THE RIBA PLAN OF WORK

The RIBA Plan of Work is a framework set-up by the Royal Institute of British Architects that outlines the process of designing, constructing, and maintaining buildings. It essential divides the entire process of building design and construction into several stages in order to provide systematic guidelines to Built Environment professionals.

At its core, the RIBA Plan of Work emphasizes that the design process is not a linear process. It suggests an iterative approach to building design that involves feedback loops, revisions, and adjustments. This iterative building design allows to improve the design as the project progresses.

By breaking down the project into stages, the RIBA Plan of Work enables a more systematic and manageable workflow. It helps ensure that each aspect of the design is thoroughly considered and validated before moving on to the next stage, ultimately leading to a more comprehensive and well-executed final product. The iterative nature of the process allows for continuous improvement and adaptation to changing circumstances, contributing to the success of the project. (RIBA, 2020)

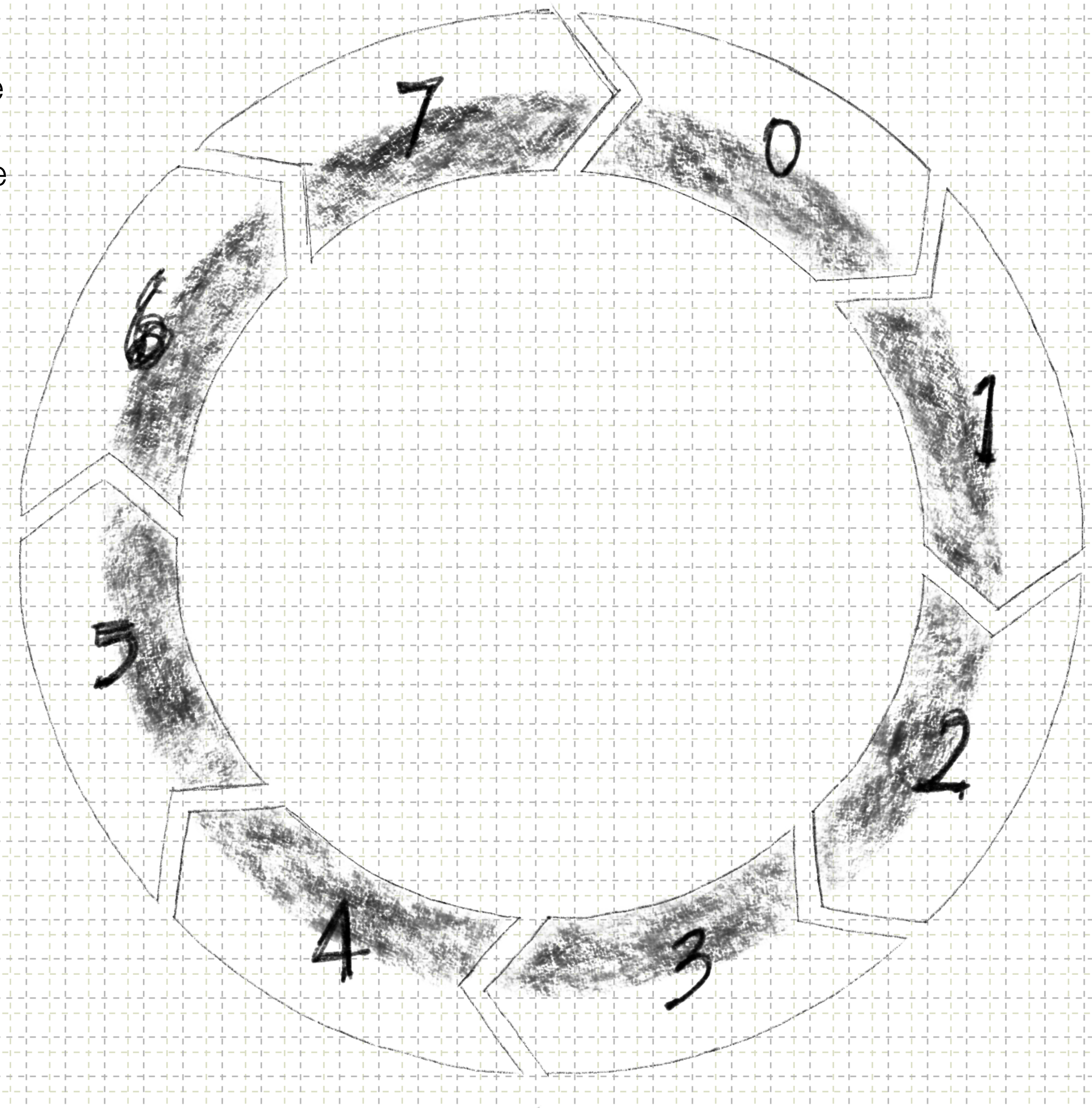


Figure 2: The RIBA Plan of Work Stages

IT'S NEED

While there might not be a single explicit reason stated by RIBA for initiating the Plan of Work, several factors likely contributed to its inception:

Industry Standardization: One key reason was the need to establish a standardized framework for managing architectural projects. Before the Plan of Work, practices varied widely, leading to inconsistencies and inefficiencies in project delivery. RIBA sought to create a common language and set of procedures that could be universally adopted within the architectural profession.

Quality Assurance: RIBA likely aimed to ensure a certain level of quality and professionalism in architectural practice. By outlining a structured process for project management, the Plan of Work helped architects and other professionals adhere to best practices and deliver high-quality outcomes consistently.

Client Expectations and Transparency: Clients increasingly sought greater transparency and predictability in the delivery of architectural projects. The Plan of Work provided a transparent framework that outlined the stages of the design and construction process, helping clients understand what to expect at each phase and facilitating clearer communication between architects and clients.

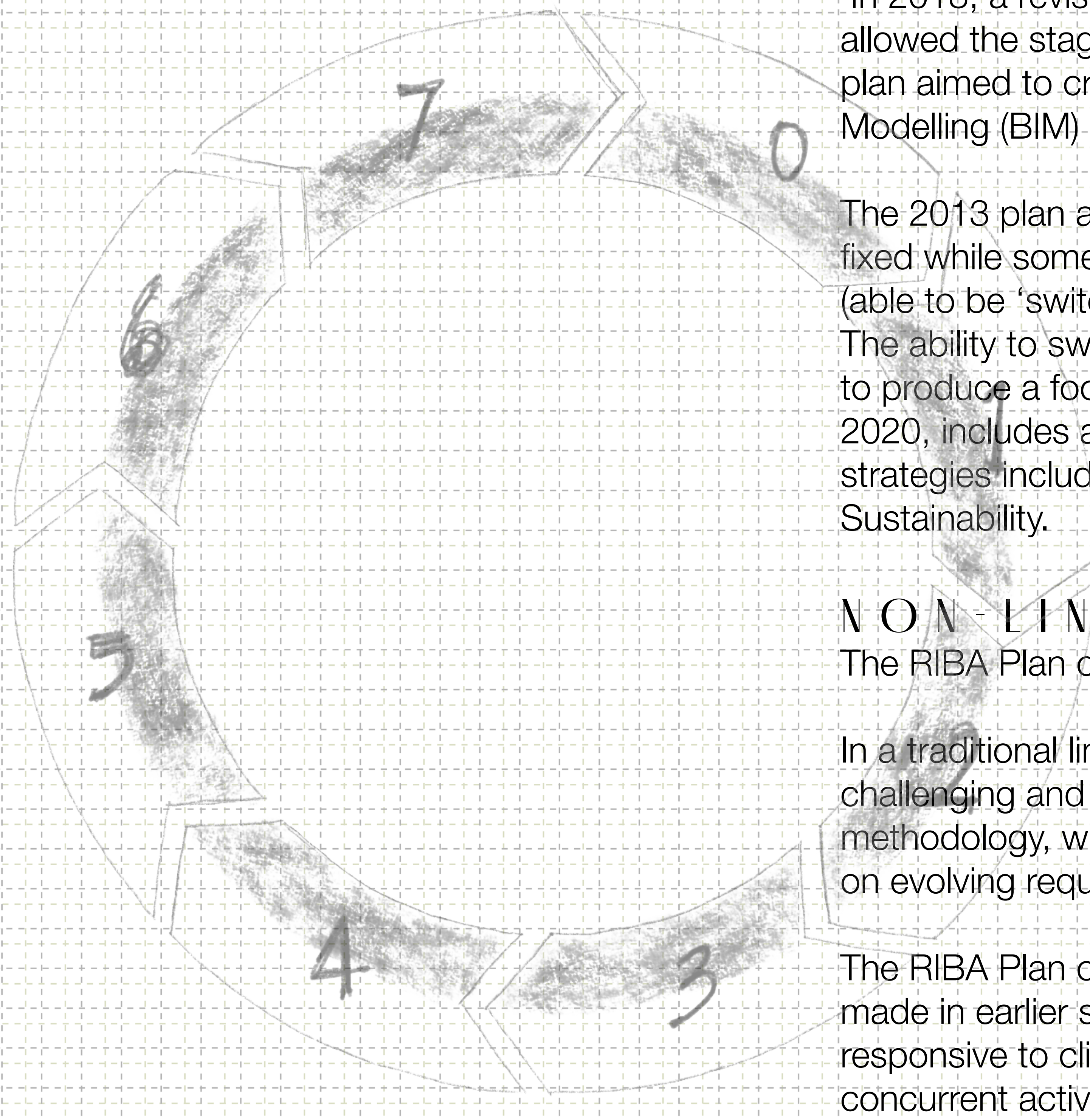
Professional Development: The Plan of Work likely aimed to support the professional development of architects. By providing a structured roadmap for project management, it helped architects progress through their careers, from junior roles to senior positions, while adhering to established principles and best practices.

Adapting to Industry Changes: The architectural profession was evolving, with projects becoming larger and more complex, and new technologies emerging. The Plan of Work may have been RIBA's response to these changes, providing a framework that could accommodate the evolving needs and challenges of modern architectural practice.

HISTORY

The RIBA Plan of Work was first introduced in 1964 and this original plan consisted of only five stages, providing a basic structure of project management. These were – Inception, Design Development, Construction Documents, Tendering and Construction. The architect's role would end at overseeing construction. Through the 1980s-90s, the plan was refined and developed to include several other detailed stages which reflected the increasing complexity of building projects. Stages such as Briefing, Concept Design, and Design Development were included into the plan. One of the most significant updates in the plan occurred in 2007. The 2007 Plan of Work consisted of eleven stages defined by letters A-L, each detailed with specific outcomes. It aimed to address the growing need for a more comprehensive approach to building design and project management.(RIBA, 2008)

In 2013, a revision was made to this plan to produce an 'Eight-Stage Plan' numbered from 0-7. This shift from letters to numbers allowed the stages to be aligned with a set of unified industry stages through the Construction Industry Council (CIC). The 2013 plan aimed to create a greater cohesion within the construction industry. Additionally, this revision integrated Building Information Modelling (BIM) into the Plan of Work, recognizing the increasing use of digital technologies in building design.(Hughes, 2003)



The 2013 plan also introduced eight task bars to replace the 'Description of key tasks' from the 2007 plan. Some task bars are fixed while some are variable (containing options specific to a practice or project specific Plan of Work) and others are selectable (able to be 'switched' on or off). The fixed bars ensure consistency across all RIBA Plan of Work 2013 documents. (RIBA, 2008) The ability to switch certain task bars on or off and to vary the content of others provided a flexible 'kit of parts' that can be used to produce a focused and bespoke practice or project specific version. Finally, the most recent version, the RIBA Plan of Work 2020, includes an expanded glossary, comparison to international plan of work equivalents and guidance to some core project strategies including Conservation, Cost, Fire Safety, Health and Safety, Inclusive Design, Planning, Plan for Use, Procurement and Sustainability.

NON-LINEAR NATURE OF THE DESIGN PROCESS

The RIBA Plan of Work reflects the acknowledgment that building design and construction is a dynamic and evolving undertaking.

In a traditional linear model, each stage is completed before moving on to the next, and making changes become more challenging and expensive as the project progresses. The non-linear approach, however, allows for a more flexible and adaptive methodology, with the understanding that design decisions made in earlier stages may need to be reviewed and amended based on evolving requirements, feedback, or unforeseen multi-disciplinary challenges.

The RIBA Plan of Work suggests a more cyclical process where feedback from later stages influences the refinement of decisions made in earlier stages. This iterative loop allows for flexibility to make continuous improvement, ensuring that the design is responsive to client needs, regulatory requirements, and emerging design considerations. Certain stages of the plan allow for concurrent activities. While some aspects of the building project are being developed, others may undergo review or input from different specialists. Having such parallel workstreams acknowledges that not all design tasks need to be completed sequentially and allow for a more efficient use of time. (RIBA, 2020)

Additionally, the non-linear nature of the design process aligns with the collaborative nature of building design. Modern architectural projects involve numerous stakeholders, including clients, engineers, contractors, and end-users. Their feedback often triggers a need to revisit earlier design decisions or amend the project scope. The iterative nature of the RIBA Plan of Work accommodates this collaborative dynamic, allowing for a more engaging and responsive design process.

SIR CHRISTOPHER WREN

Sir Christopher Wren is a pivotal figure in the history of architecture, particularly in the United Kingdom. Renowned for his multifaceted talents as an architect, mathematician, and astronomer, Wren played a pivotal role in introducing the principles of classical architecture to Britain during the late 17th century. Given Wren's pivotal role in revolutionizing British architecture and his seminal contributions to the built environment, there is perhaps no better figure to serve as the starting point for a study of architectural evolution

LONG GESTATION OF PROJECTS: ST PAUL'S CATHEDRAL

In the annals of architectural history, the extended gestation period of monumental structures stands as a testament to the intricate dance between vision, technology, and evolving aesthetics. One such exemplar of this protracted evolution is St Paul's Cathedral in London, a majestic edifice that took nearly five decades to materialize. Beyond being a physical manifestation of divine worship, St Paul's Cathedral becomes a compelling case study in the iterative nature of architectural design during extended gestation.

The genesis of St Paul's Cathedral traces back to the brilliant mind of Sir Christopher Wren, whose original vision, encapsulated in the 'Warrant Design,' laid the groundwork for a structure that would transcend time. However, the lengthy construction timeline provided a canvas for iterative evolution. As the cathedral rose from the London skyline over the course of 50 years, it became a collaborative masterpiece shaped not only by Wren's initial vision but also by the interpretative contributions of subsequent architects. (Tikkanen, 2019)

Christopher Wren's extended engagement with St Paul's Cathedral provided fertile ground for the manifestation of architectural evolution. As the project unfolded, the evolving technological landscape and the interplay of Wren's own maturing design philosophy led to subtle but significant changes. Yet, the iterative nature of St Paul's Cathedral became most apparent with the introduction of Nicholas Hawksmoor and Sir John Vanburgh, architects from the next generation who left indelible imprints on the upper features of the cathedral, notably the lanterns atop the west towers.

Examining the 'Warrant Design' alongside the completed St Paul's Cathedral reveals the layers of iteration that unfolded during its protracted gestation. The lanterns, in particular, stand as beacons of evolving aesthetics, showcasing the fusion of distinct design philosophies. The assumption of a linear progression from a finalized design to execution crumbles in the face of this iterative journey, where each architect's contribution adds nuanced layers to the evolving narrative.

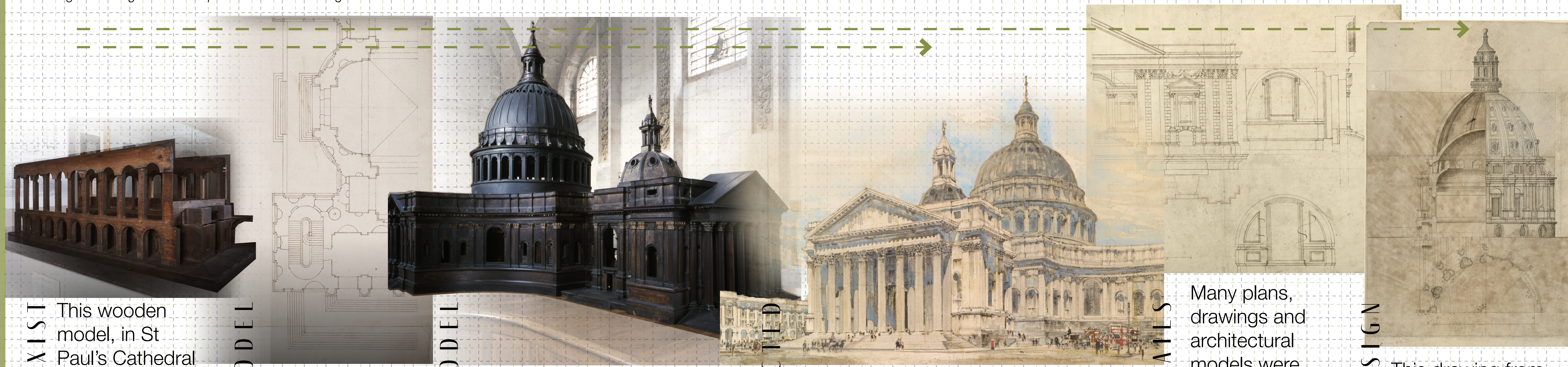
The extended gestation of St Paul's Cathedral was not merely a consequence of temporal constraints but a reflection of the dynamic interplay between technology and design evolution. Technological advancements, or limitations at times, played a pivotal role in shaping the cathedral's form. The iterative adaptation to these technological nuances ensured that the final structure was not a stagnant representation of an initial plan but a living testament to the creative dialogue between architect, material, and method. (Google Arts & Culture, n.d.)

Figure 3: Watercolour drawing of the 'Warrant Design' of St. Paul's Cathedral by Wren

Figure 4: St. Paul's Cathedral - Built

6 TEMPORAL DIMENSION OF ITERATION

Figure 5: Diagrammatic Representation of the stages of Evolution of the St. Paul's Cathedral



EARLIEST MODEL TO EXIST

This wooden model, in St Paul's Cathedral Collections, is all that survives of Wren's first complete design for a new St Paul's. It was lost for many years and rediscovered in 1935.

If built, this cathedral would have taken the form of an oblong basilica and would have been similar in appearance to St James, Piccadilly in London.

WREN'S PLAN FOR THE GREAT MODEL

This drawing is probably by Christopher Wren.

It develops his design from a building in the form of a Greek cross, in which the four arms of the structure are the same dimensions, towards his Great Model design with an extended nave.

The western range in this design probably represents the addition of the 'library body and portico' to the design of the model recorded by Robert Hooke in early February 1673.

THE GREAT MODEL

Having created a set of drawings, Wren had William and Richard Cleere produce a model to his design.

IF THE GREAT MODEL WERE CONSTRUCTED

This water colour painting shows what St Paul's cathedral would look like if Christopher Wren had completed the building to the Great Model design. Although they are superficially similar, there are significant difference between the Great Model design and the cathedral as it was finally built.

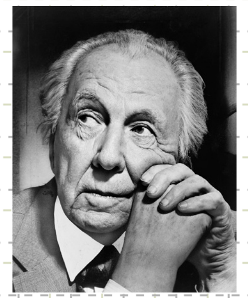
The Model was a presentation piece designed to show the appearance of what Wren was proposing. There are several structural elements which work at this scale in wood but which would not have been possible if built, actual size, in stone. When Wren started designing in earnest he, and his assistants, had a lot of working out to do.

WORKING OUT STRUCTURAL DETAILS

Many plans, drawings and architectural models were made as the Wren Office explored how the building could be achieved. 226 drawings survive in the cathedral collection, some are by Wren himself, and at least thirteen other individuals, who helped to design the cathedral, have been identified, including: Nicholas Hawksmoor, Edward Woodroofe and Edward Pearce.

FINAL DOME DESIGN

This drawing from the 1680s was made when the cathedral had been built up to the base of the drum of the dome. Here you can see the inner and outer domes which Wren wished to build but at this stage the addition of a brick cone between the two domes, to take the weight of the lantern, has yet to be thought of.



FRANK LLYOD WRIGHT

THE SYSTEM

Frank Lloyd Wright's architectural approach was deeply rooted in his belief that architecture should reflect a cohesive and interconnected system, both in its design principles and its integration with nature and society. Wright's concept of his work as a system can be elaborated upon by examining his Prairie Houses and their relationship to his early education, particularly his exposure to the Froebel system.

Frank Lloyd Wright's early education was influenced by the Froebel system, developed by German educator Friedrich Froebel. The Froebel system emphasized the interconnectedness of knowledge and the importance of hands-on learning through play and exploration. (MacCormac, 1974) Froebel's educational philosophy focused on nurturing creativity, individual expression, and a sense of harmony with nature. Wright's exposure to the Froebel system during his formative years had a profound impact on his worldview and his approach to architecture. (Koning and Eizenberg, 1981)

Wright's architecture can be seen as an extension of the Froebel principles he absorbed during his early education. Like the Froebel system, Wright's architecture emphasized the interconnectedness of elements and the integration of the built environment with nature. Wright presented his work as a system. (Wright, 1908)

The organic forms, geometric clarity, and emphasis on unity and harmony in Wright's designs can be traced back to his early exposure to Froebel's educational philosophy. Wright's systematic approach to architecture can be understood as an application of Froebel's holistic principles to the built environment, creating spaces that are both functional and spiritually enriching.

Wright's Prairie Houses, designed primarily between 1901 and 1910, exemplify his systematized architectural approach. These houses were characterized by their horizontal lines, low-pitched roofs, open interior spaces, and integration with the surrounding landscape. Wright aimed to create organic, unified compositions that reflected the natural environment and the needs of the inhabitants. The design principles of the Prairie Houses were consistent across various projects, showcasing Wright's systematic approach to architecture.

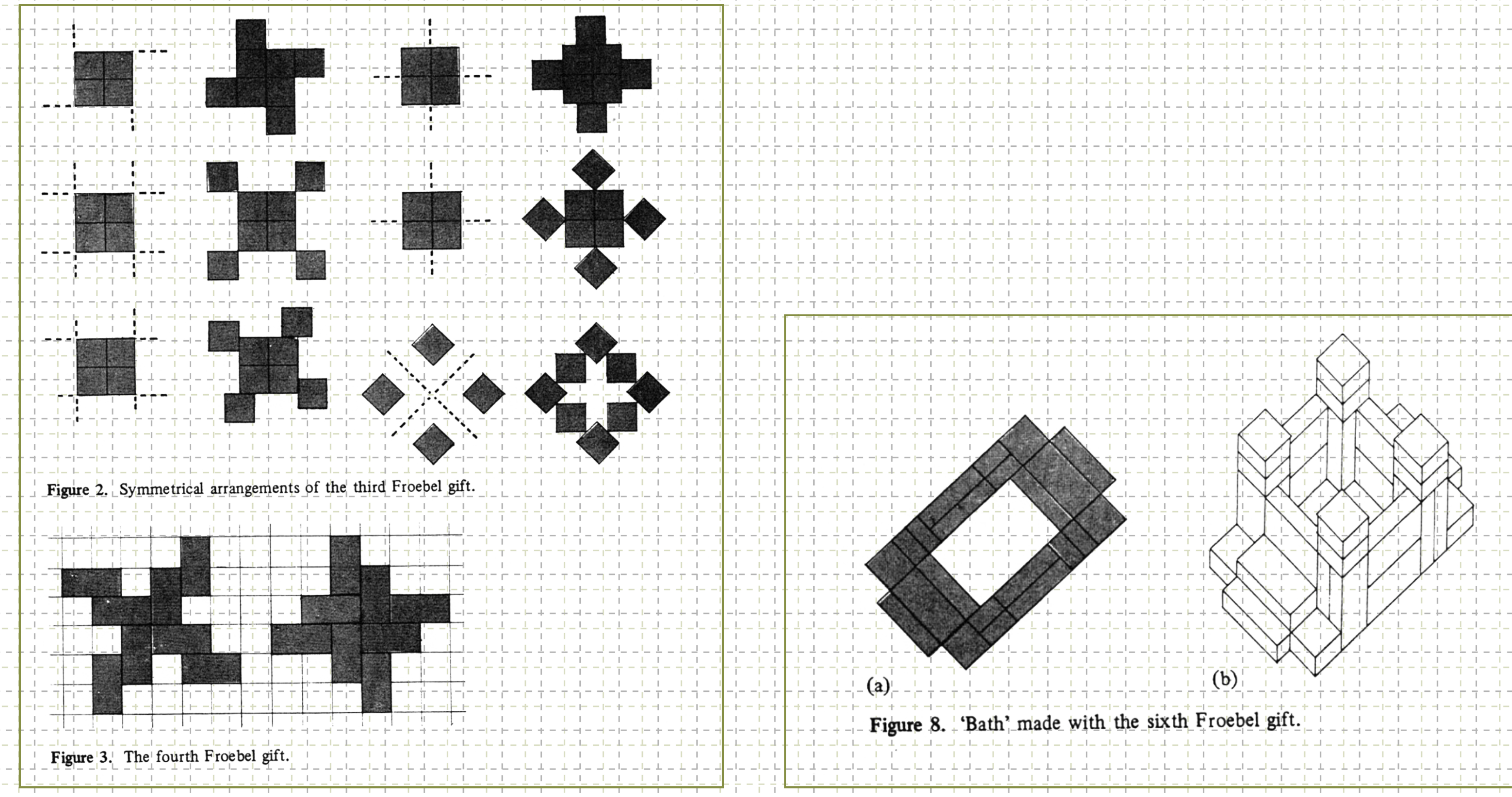


Figure 6: MacCormac's Illustration's showing various arrangements and compositions of Froebel Gifts

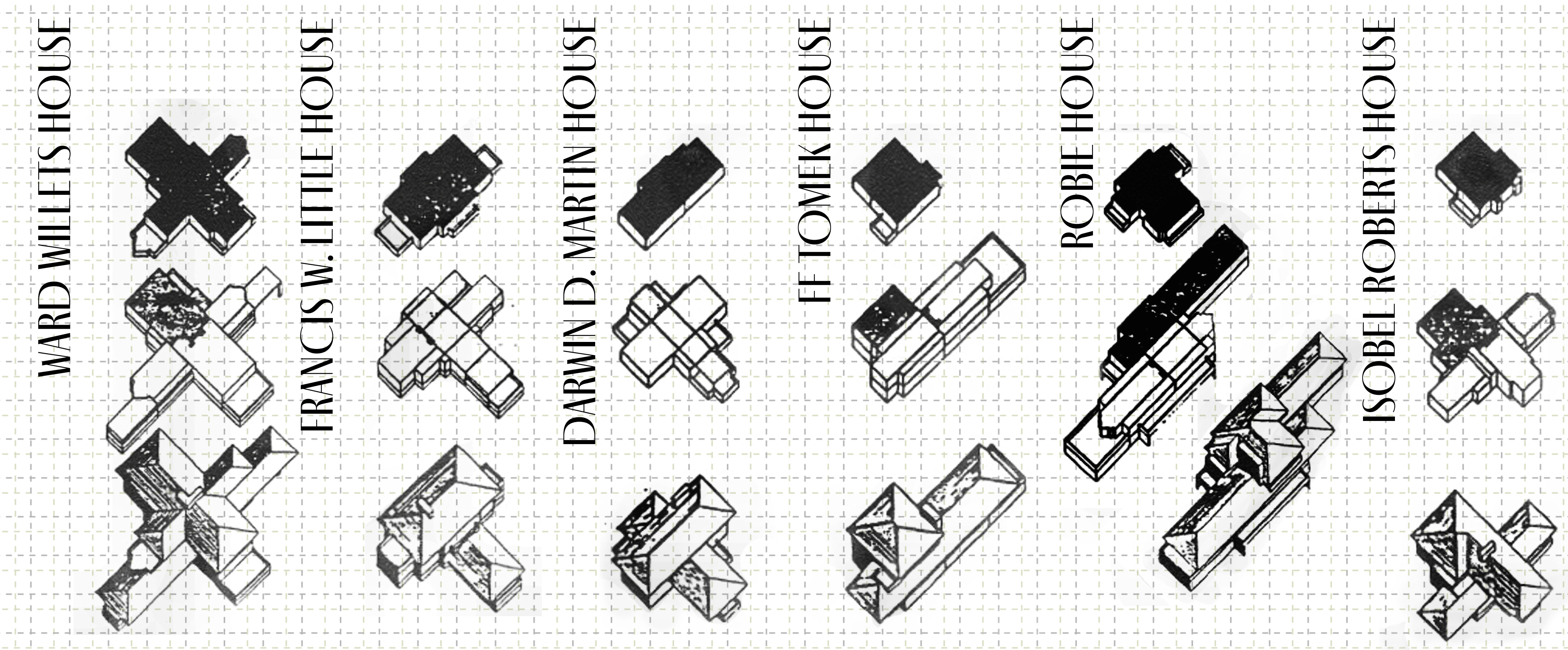


Figure 7: Floor-by-floor breakdown of massing in FLW's Prairie Houses

THE PRE-PRAIRIE ERA

Before Frank Lloyd Wright embarked on his iconic Prairie style, he went through a phase characterized by experimentation with traditional architectural forms. This period, often referred to as his "pre-Prairie era," showcases Wright's early development as an architect and his gradual departure from conventional design conventions.

One notable feature of this phase is Wright's use of gabled roofs, a common architectural element in the late 19th century. Wright's early works, such as the Winslow House and the Thomas Gale House, feature prominent gabled roofs. These houses, while exhibiting elements of Wright's emerging architectural style, still adhere to traditional forms and proportions.The gabled roofs, a hallmark of late 19th-century architecture, provide a sense of familiarity and continuity with prevailing architectural trends.

THE PRAIRIE RULES

Frank Lloyd Wright developed a systematic approach to designing suburban houses during the period between 1901 and 1910, famously known as the Prairie Houses. Wright consciously conceived this approach as a 'cohesive system', reflecting his belief in architecture as an interconnected expression of nature and society. The Prairie Houses exemplify Wright's systematic architectural philosophy, characterized by several key elements. Figure 10 shows his self described 'rules' for Prairie Houses. (Wright, 1908)

One of the defining features of Wright's Prairie Houses is the strong horizontal emphasis, achieved through low-pitched roofs, long and horizontal floor plans, and continuous bands of windows.

Wright sought to integrate his designs harmoniously with the surrounding landscape, blurring the boundaries between interior and exterior spaces. This integration was achieved through features such as open floor plans, extensive use of natural materials, and the incorporation of outdoor living spaces.

Each Prairie House reflects a unified and cohesive composition, with every element contributing to the overall harmony and balance of the design. Wright carefully orchestrated the arrangement of spaces, volumes, and materials to create a sense of unity and coherence.

Wright's Prairie Houses were designed to meet the functional needs of their inhabitants while also embodying a sense of aesthetic beauty and spiritual harmony. The open floor plans, efficient use of space, and attention to detail all contributed to the houses' practicality and livability.

Figure 8: Winslow House

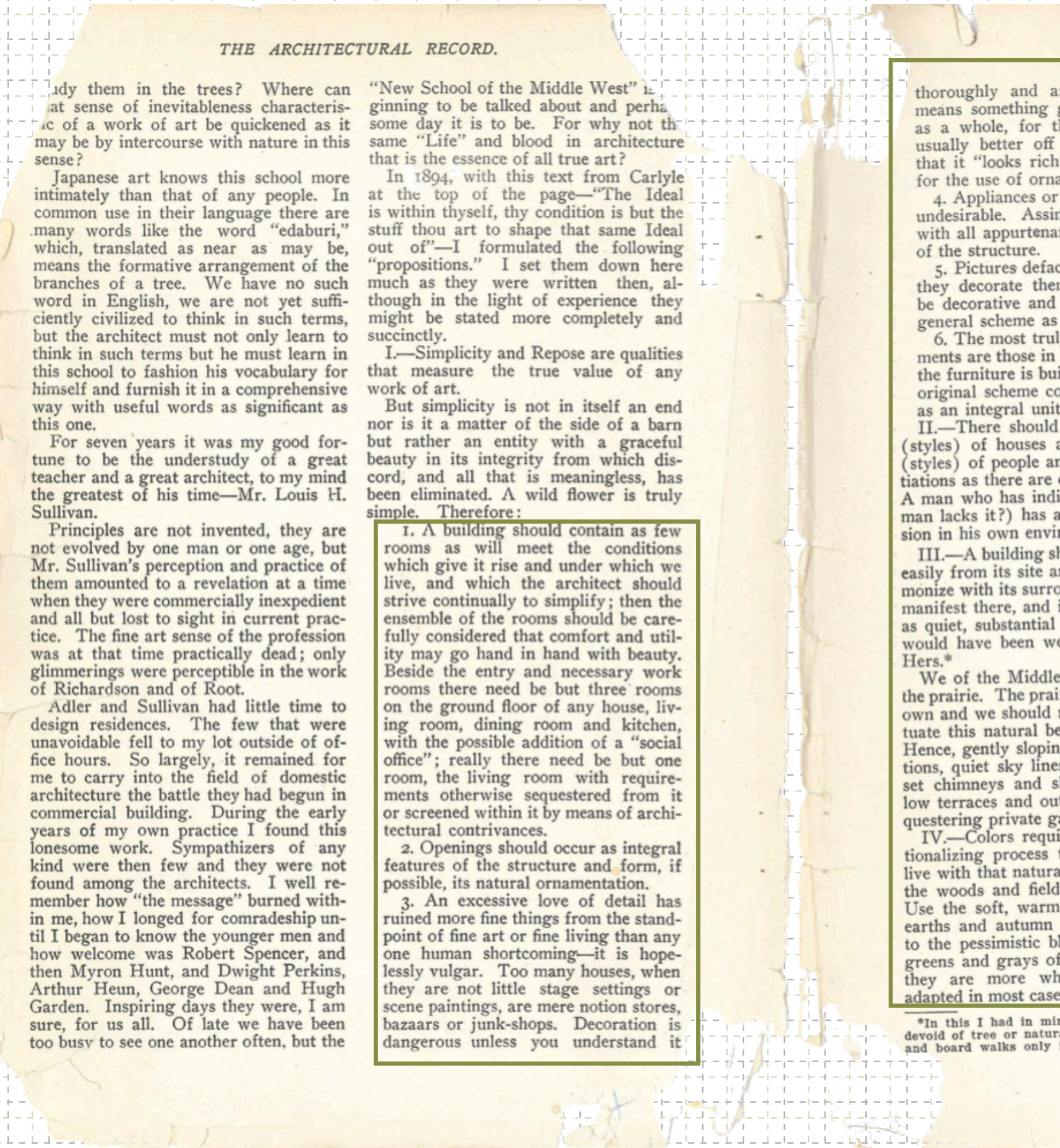
Figure 9: Thomas Gale House

PRAIRIE ITERATIONS

Within the systematic framework of Prairie House design, many aspects of the houses remained stable and unaltered, serving as consistent elements of Wright's architectural language. However, some features were repeatedly changed or experimented with, indicating formal issues that Wright was still grappling with and seeking to resolve.

MATERIALITY

The First of these instances that can be observed is the iteration through change in materiality. For instance, Wright has used plaster in the facade treatment of the F.F. Tomek house and has iterated this by using a similar facade treatment but using brick instead in the case of the Robie House.



THE ARCHITECTURAL RECORD.

udy them in the trees? Where can at sense of inevitableness characteristic of a work of art be quickened as it may be by intercourse with nature in this sense?

Japanese art knows this school more intimately than that of any people. In common use in their language there are many words like the word "edaburi," which, translated as near as may be, means the formative arrangement of the branches of a tree. We have no such word in English, we are not yet sufficiently civilized to think in such terms, but the architect must not only learn to think in such terms but he must learn in this school to fashion his vocabulary for himself and furnish it in a comprehensive way with useful words as significant as this one.

For seven years it was my good fortune to be the understudy of a great teacher and a great architect, to my mind the greatest of his time—Mr. Louis H. Sullivan.

Principles are not invented, they are not evolved by one man or one age, but Mr. Sullivan's perception and practice of them amounted to a revelation at a time when they were commercially inexpedient and all but lost to sight in current practice. The fine art sense of the profession was at that time practically dead; only glimmerings were perceptible in the work of Richardson and of Root.

Adler and Sullivan had little time to design residences. The few that were unavoidable fell to my lot outside of office hours. So largely, it remained for me to carry into the field of domestic architecture the battle they had begun in commercial building. During the early years of my own practice I found this lonesome work. Sympathizers of any kind were then few and they were not found among the architects. I well remember how "the message" burned within me, how I longed for comradeship until I began to know the younger men and how welcome was Robert Spencer, and then Myron Hunt, and Dwight Perkins, Arthur Heun, George Dean and Hugh Garden. Inspiring days they were, I am sure, for us all. Of late we have been too busy to see one another often, but the "New School of the Middle West" is beginning to be talked about and perha some day it is to be. For why not th same "Life" and blood in architecture that is the essence of all true art?

In 1894, with this text from Carlyle at the top of the page—"The Ideal is within thyself, thy condition is but the stuff thou art to shape that same Ideal out of"—I formulated the following "propositions." I set them down here much as they were written then, although in the light of experience they might be stated more completely and succinctly.

I.—Simplicity and Repose are qualities that measure the true value of any work of art.

But simplicity is not in itself an end nor is it a matter of the side of a barn but rather an entity with a graceful beauty in its integrity from which discord, and all that is meaningless, has been eliminated. A wild flower is truly simple. Therefore:

1. A building should contain as few rooms as will meet the conditions which give it rise and under which we live, and which the architect should strive continually to simplify; then the ensemble of the rooms should be carefully considered that comfort and utility may go hand in hand with beauty. Beside the entry and necessary work rooms there need be but three rooms on the ground floor of any house, living room, dining room and kitchen, with the possible addition of a "social office"; really there need be but one room, the living room with requirements otherwise sequestered from it or screened within it by means of architectural contrivances.

2. Openings should occur as integral features of the structure and form, if possible, its natural ornamentation.

3. An excessive love of detail has ruined more fine things from the standpoint of fine art or fine living than any one human shortcoming—it is hopelessly vulgar. Too many houses, when they are not little stage settings or scene paintings, are mere notion stores, bazaars or junk-shops. Decoration is dangerous unless you understand it

IN THE CAUSE OF ARCHITECTURE. 157

thoroughly and are satisfied that it means something good in the scheme as a whole, for the present you are usually better off without it. Merely that it "looks rich" is no justification for the use of ornament.

4. Appliances or fixtures as such are undesirable. Assimilate them together with all appurtenances into the design of the structure.

5. Pictures deface walls oftener than they decorate them. Pictures should be decorative and incorporated in the general scheme as decoration.

6. The most truly satisfactory apartments are those in which most or all of the furniture is built in as a part of the original scheme considering the whole as an integral unit.

II.—There should be as many kinds (styles) of houses as there are kinds (styles) of people and as many differentiations as there are different individuals. A man who has individuality (and what man lacks it?) has a right to its expression in his own environment.

III.—A building should appear to grow easily from its site and be shaped to harmonize with its surroundings if Nature is manifest there, and if not try to make it as quiet, substantial and organic as She would have been were the opportunity Hers.*

We of the Middle West are living on the prairie. The prairie has a beauty of its own and we should recognize and accentuate this natural beauty, its quiet level. Hence, gently sloping roofs, low proportions, quiet sky lines, suppressed heavy-set chimneys and sheltering overhangs, low terraces and out-reaching walls sequestering private gardens.

IV.—Colors require the same conventionalizing process to make them fit to live with that natural forms do; so go to the woods and fields for color schemes. Use the soft, warm, optimistic tones of earths and autumn leaves in preference to the pessimistic blues, purples or cold greens and grays of the ribbon counter; they are more wholesome and better adapted in most cases to good decoration.

*In this I had in mind the barren town lots devoid of tree or natural incident, town houses and board walks only in evidence.

V.—Bring out the nature of the materials, let their nature intimately into your scheme. Strip the wood of varnish and let it alone—stain it. Develop the natural texture of the plastering and stain it. Reveal the nature of the wood, plaster, brick or stone in your designs; they are all by nature friendly and beautiful. No treatment can be really a matter of fine art when these natural characteristics are, or their nature is, outraged or neglected.

VI.—A house that has character stands a good chance of growing more valuable as it grows older while a house in the prevailing mode, whatever that mode may be, is soon out of fashion, stale and unprofitable.

Buildings like people must first be sincere, must be true and then withal as gracious and lovable as may be.

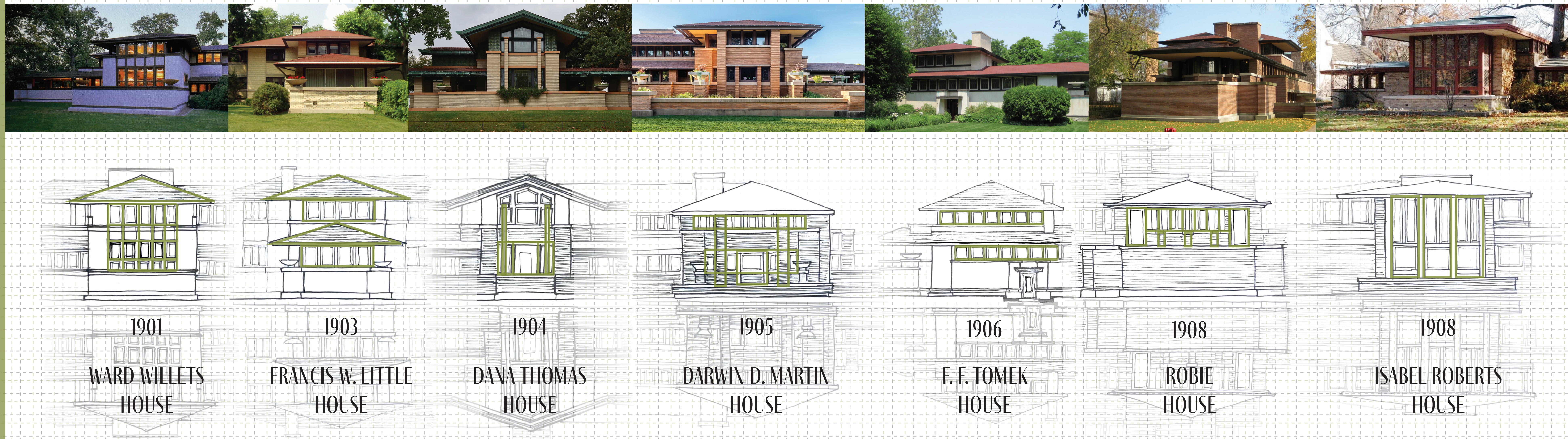
Above all, integrity. The machine is the normal tool of our civilization, give it work that it can do well—nothing is of greater importance. To do this will be to formulate new industrial ideals, sadly needed.

These propositions are chiefly interesting because for some strange reason they were novel when formulated in the face of conditions hostile to them and because the ideals they phrase have been practically embodied in the buildings that were built to live up to them. The buildings of recent years have not only been true to them, but are in many cases a further development of the simple propositions so positively stated then.

Happily, these ideals are more commonplace now. Then the sky lines of our domestic architecture were fantastic abortions, tortured by features that disrupted the distorted roof surfaces from which attenuated chimneys like lean fingers threatened the sky; the invariably tall interiors were cut up into box-like compartments, the more boxes the finer the house; and "Architecture" chiefly consisted in healing over the edges of the curious collection of holes that had to be cut in the walls for light and air and to permit the occupant to get in or out. These interiors were always slaughtered with the butt and slash of the old plinth and corner block trim, of dubious origin,

Figure 10: Extract from Frank Lloyd Wright's Article for the Architectural Record, Annoted FLW's rules for Prairie House

Figure 11: Evolution of Window Placement on top of one another in the Prairie Facades, Rendered Images and Annotated Sketches



WINDOW PLACEMENT

Frank Lloyd Wright's exploration of facade treatment, specifically in the placement of windows on top of one another, evolved significantly throughout his career.

This section examines the chronological progression of this formal problem through various iterations in Wright's architectural works.

In the Ward Willets House, Wright introduced a strip of windows at the ground and first floors that are vertically linked. This initial approach demonstrates Wright's early exploration of vertically stacked windows as a cohesive design element.

In the Francis W. Little House, Wright decided to separate the two rows of windows by adding a pitched roof porch, leaving no vertical link between them. This iteration marks a departure from the continuous strip of windows seen in the Ward Willets House, introducing a new formal treatment of the facade.

In the Dana Thomas House, Wright returned to vertically linking the top and bottom rows of windows, abandoning the strip of windows seen in the Ward Willets House. However, he introduced single large expanses of windows linked vertically, while also experimenting with different materials on the facade, including the use of the green plaster.

The Darwin D. Martin House further iterated on the treatment of vertically linked windows, separating them horizontally into two levels. The windows were connected more extensively through the vertical members of the facade, showcasing Wright's evolving approach to facade composition.

The F. F. Tomek House departed from the previous styles, featuring two long rows of gridded windows separated horizontally. This distinctive treatment of windows made the facade stand out and created this buildings visual identity.

In the Robie House, Wright introduced two double-height windows on either side of the facade, with longer windows in the center. This iteration increased the sense of verticality in the facade treatment, emphasizing the hierarchy of windows and creating a dynamic composition. The lower roof running across the gable end however, eliminates the problem of the two-storey elevation in the case of Robie and Tomek.

Finally, in the Isabel Roberts House, Wright seemed to resolve the formal problem of facade treatment by opting for a completely glazed facade with two-story floor-to-ceiling windows. This bold design choice represents a culmination of Wright's exploration of vertically stacked windows, achieving a harmonious balance between transparency, light, and spatial openness.

ESTABLISHING A LINK

The transition from Frank Lloyd Wright to Rudolf Schindler can be established through their shared exploration of architectural solutions, particularly in addressing the challenge of chunky corners in elevations. Wright's Freeman House marked a departure from his usual design approach with its chunky corners, which were mitigated through the introduction of glazed corners. This innovative solution laid the groundwork for Schindler's subsequent exploration of glazed corners in his design for the Bethlehem Baptist Church.

Building upon Wright's experimentation, Schindler's design for the Bethlehem Baptist Church further advanced the use of glazed corners, demonstrating his ability to adapt and innovate within the context of architectural challenges. This progression showcases Schindler's departure from Wright's influence while maintaining a continuity in addressing architectural problems through inventive design solutions.

Moving forward, the connection between Rudolf Schindler, Aldo Van Eyck, and Hans Hollein can be drawn through their exploration of square spaces with diagonally opposite corners cut away. Schindler's Bethlehem Baptist Church and Van Eyck's Amsterdam Orphanage both exemplify this design motif, reflecting a shared interest in dynamic spatial configurations and interlocking spaces. George Kubler's Theory of Association, as outlined in his book "The Shape of Time," can be applied to justify this link, highlighting the visual and conceptual similarities between the works of these architects.

Hans Hollein's Abteiberg Municipal Museum further expands upon this exploration, demonstrating a continuation of the theme of square spaces with cut corners. Hollein's design, like those of Schindler and Van Eyck, oscillates between orthogonal and diagonal interpretations, creating a network of interconnected spaces that challenge traditional notions of form and spatial organization.

1887-1953
RUDOLF SCHINDLER

1918-1999
ALDO VAN EYCK

1934-2014
HANS HOLLEIN

DIAGONAL LINKING OF SQUARES WITH CUT-OFF CORNERS

The architectural exploration of square spaces with two diagonally opposite corners cut away, leading to networks of interlocking spaces that blur the lines between orthogonal and diagonal interpretations, is a fascinating theme that traverses the works of Rudolf Schindler, Aldo Van Eyck, and Hans Hollein. Each architect approached this concept with unique perspectives and intentions, resulting in distinctive interpretations that reflect their individual styles and philosophies.

Rudolf Schindler's Bethlehem Baptist Church in Los Angeles serves as a prime example of his exploration of this formal development. Designed in 1944, the church features a series of interconnected square volumes with corners cut away, creating dynamic spatial relationships and fluid transitions between interior and exterior spaces. Schindler's use of diagonally linked squares allows for seamless movement throughout the building, blurring the distinction between orthogonal and diagonal orientations. The church's open-plan layout and integration with the surrounding landscape exemplify Schindler's organic approach to architecture, where form follows function and spaces are designed to facilitate communal interaction and spiritual contemplation.

Aldo Van Eyck's Amsterdam Orphanage, completed in 1960, further advances the exploration of this formal motif. Van Eyck's design revolves around a central courtyard surrounded by a grid of square pavilions, each with corners cut away to create recessed entrances and interconnected pathways. The diagonally linked squares form a network of spatial relationships that encourages social interaction and movement, echoing Van Eyck's belief in architecture as a social art. The orphanage's playful use of geometry and emphasis on human scale reflect Van Eyck's commitment to creating inclusive and adaptable spaces that foster a sense of belonging and community.

Hans Hollein's Abteiberg Museum in Germany represents a more contemporary interpretation of this formal exploration. Completed in 1982, the museum features a striking geometric facade composed of overlapping squares and rectangles, with corners cut away to reveal glass-enclosed galleries within. Hollein's design blurs the boundaries between interior and exterior spaces, inviting visitors to explore the museum's collection while engaging with the surrounding urban context. The diagonally linked squares in Hollein's design serve not only as architectural elements but also as visual and conceptual devices, symbolizing the interconnectedness of art, architecture, and culture.

8 COLLECTIVE CONTRIBUTIONS

BETHLEHEM BAPTIST CHURCH 1944

AMSTERDAM ORPHANAGE 1960

ABTEIBERG MUNICIPAL MUSEUM 1982

EXTERIOR

Figure 12: Bethlehem Baptist Church exterior

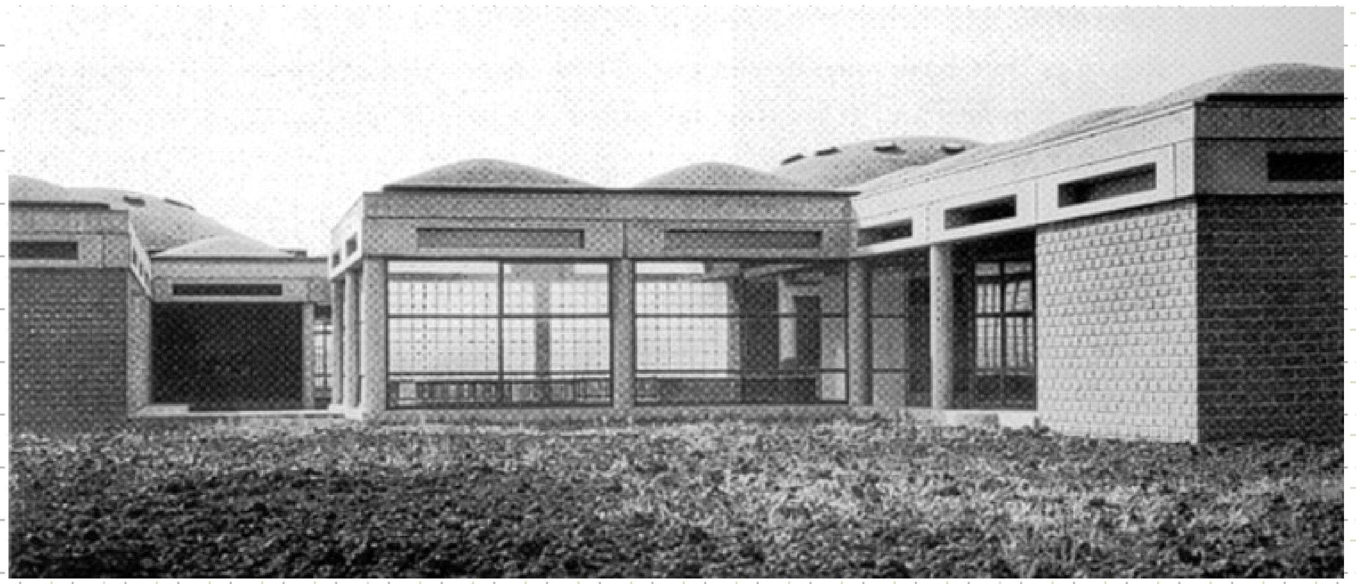


Figure 15: Amsterdam Orphanage exterior

Figure 18: Abteiberg Municipal Museum exterior

INTERIOR

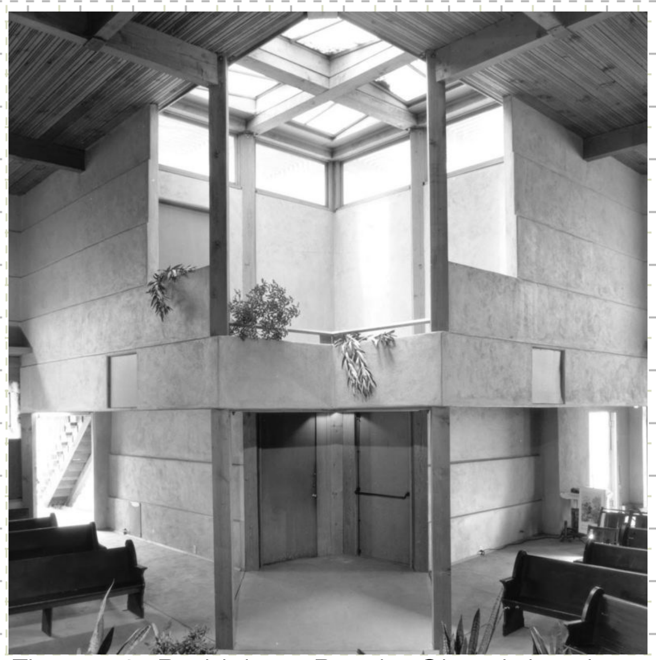


Figure 13: Bethlehem Baptist Church interior

Figure 16: Amsterdam Orphanage interior

Figure 19: Abteiberg Municipal Museum interior

PLAN

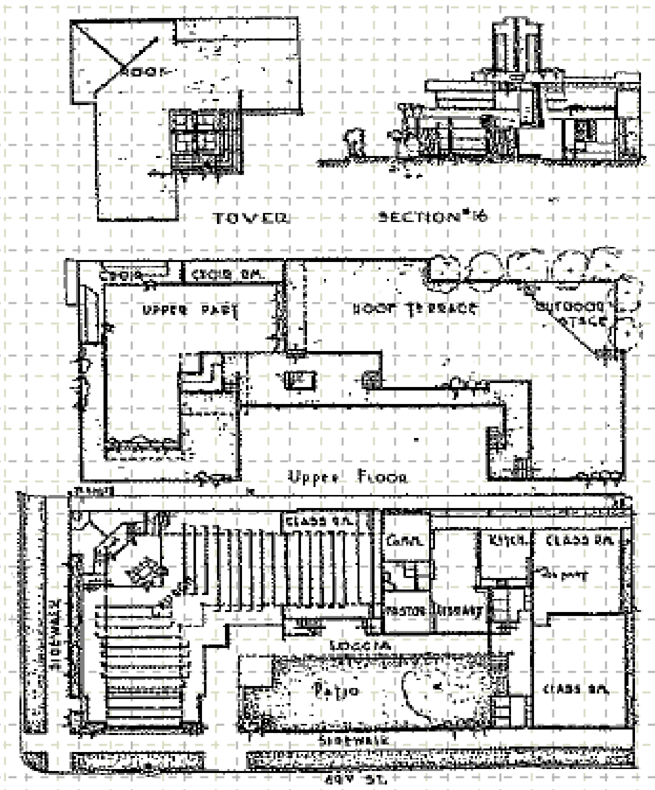


Figure 14: Schindler's Plans of Bethlehem Baptist Church

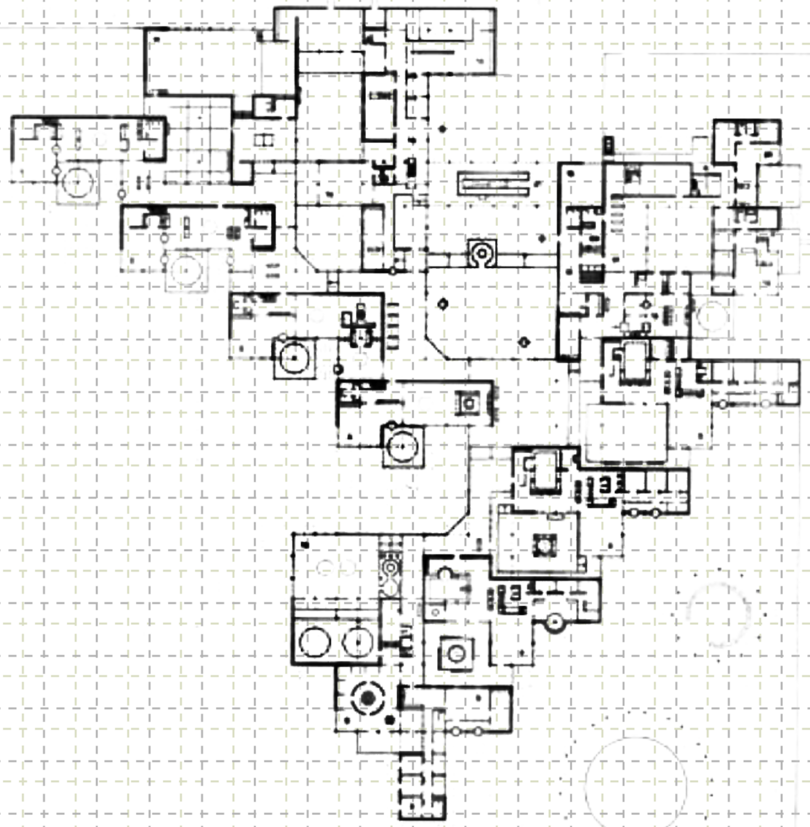


Figure 17: Amsterdam Orphanage Plan

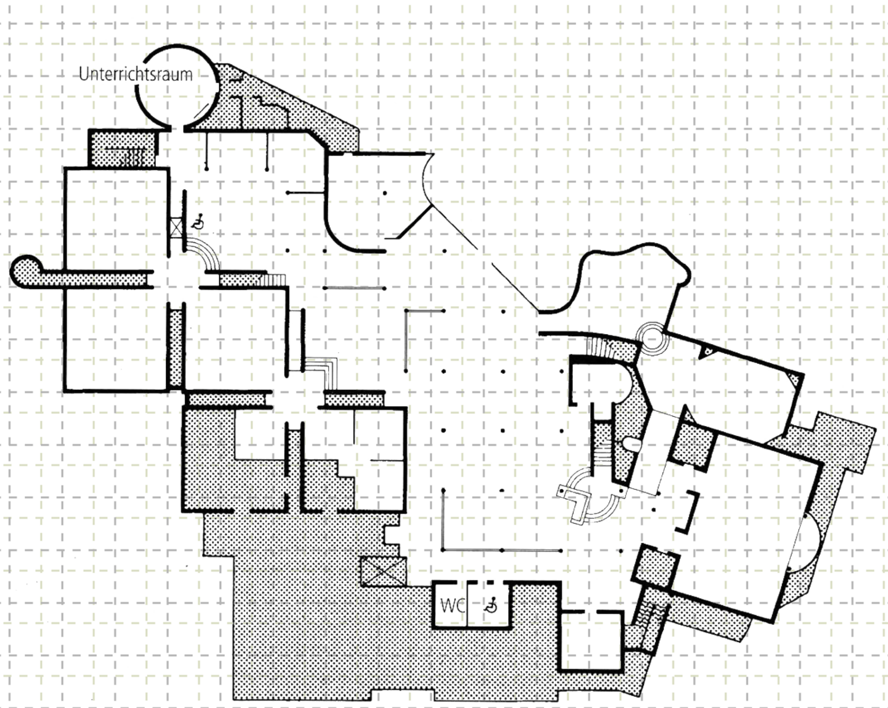


Figure 20: Abteiberg Municipal Museum Plan

MODULARITY

Modular iteration in architecture encompasses the exploration of standardized components and their arrangements to solve complex design problems.

One such challenge is the placement of a projecting beam over a series of columns, especially when it's desired to have one right at the corner of a building. This dilemma has persisted throughout architectural history, evident in Ancient Greek temple architecture and can be seen iterated in the sketches shown at the bottom. (Motwani, 2024)

Another example is seen in the structural challenges faced by Gothic cathedrals in France during the Medieval Period.In the case of the French cathedral designers strove incrementally for ever-higher spaces they eventually exceeded the limits of structural stability at Beauvais. (Fletcher, 1931)

Rafael Moneo's architectural career serves as a specialized case of modular iteration, wherein each building he creates represents a progression within a specific typology. Much like the iterative process seen in resolving structural challenges, Moneo's designs evolve and refine architectural typologies over time. His approach involves studying historical precedents and adapting them to contemporary contexts, resulting in buildings that are both innovative and rooted in tradition.

By studying Moneo's architectural style as a form of modular iteration, we gain insights into the iterative nature of architectural design, where each building serves as a step forward in the evolution of architectural typologies.

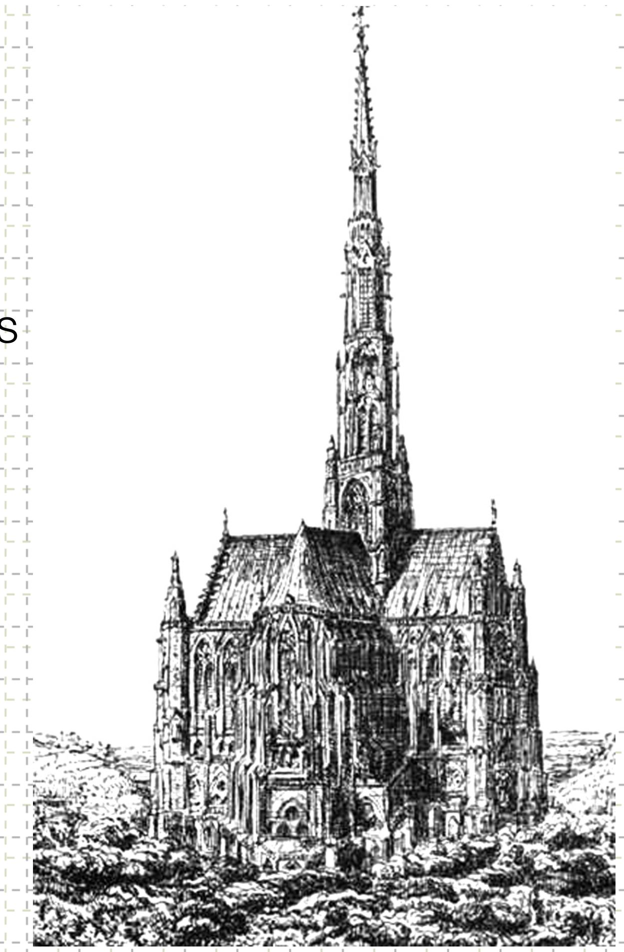


Figure 21: Beuavais Cathedral before collapse

Figure 22: Beuavais Cathedral undergoing refurbishment

Figure 23: Beuavais Cathedral-present

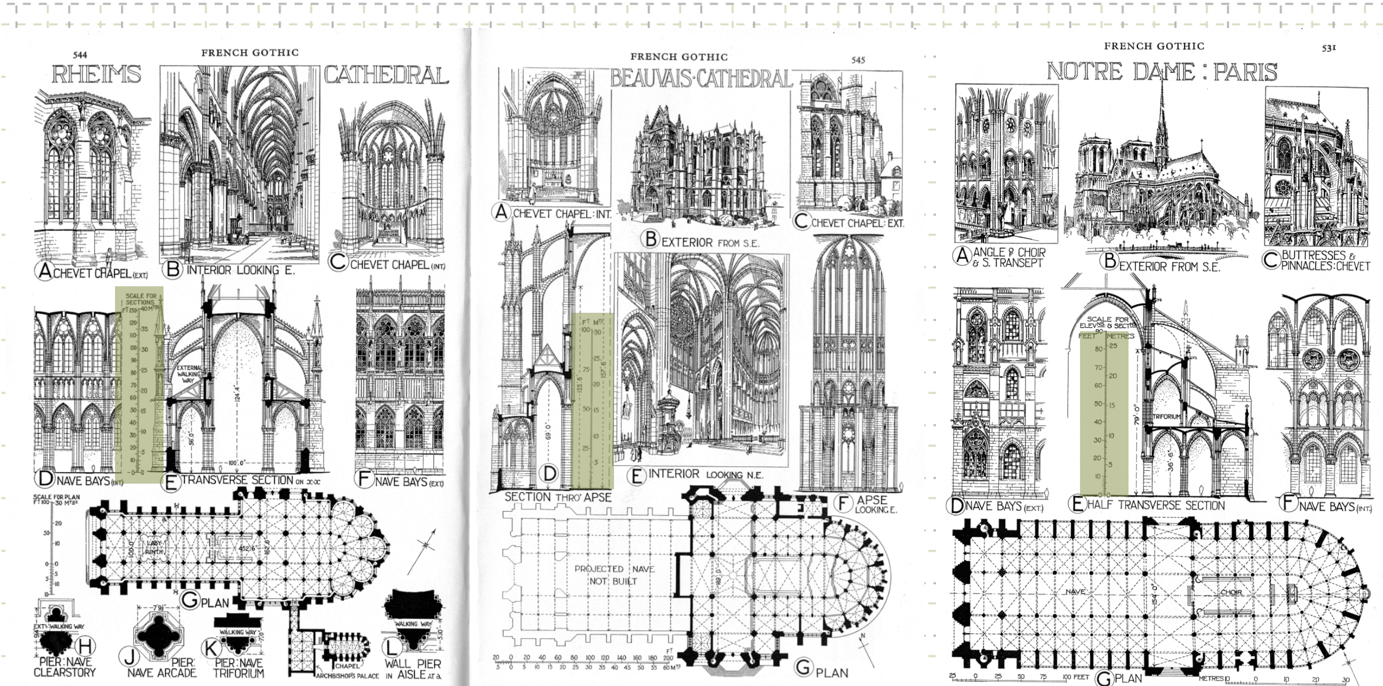


Figure 24: Comparison of Heights of various French Cathedrals

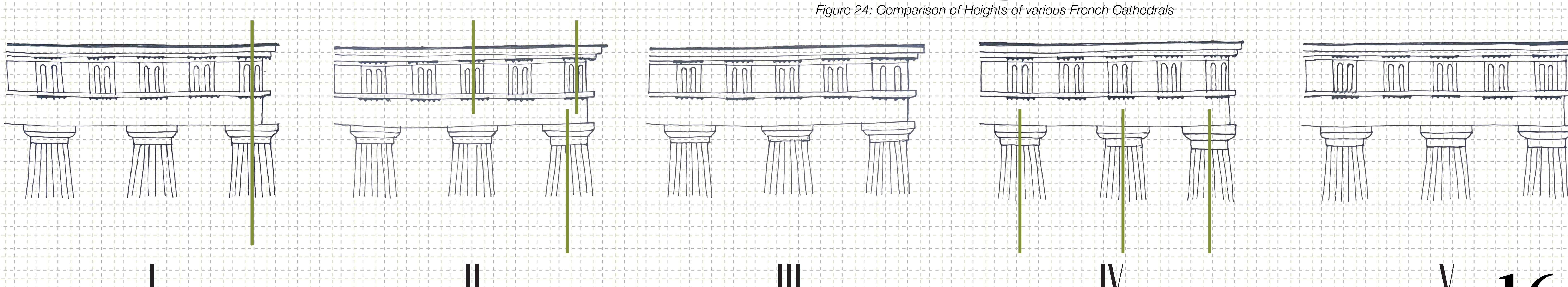


Figure 25: Sketches showing column-beam placement design problem

RAFAEL MONEO

MONEO AND KUBLER

At first glance, it may be unlikely to assume a correlation between spanish architect Rafael Moneo and art historian George Kubler. However, a deeper exploration reveals a fascinating intersection between their ideas and perspectives on architectural design and evolution.

In his essay 'On Typology', Moneo touches upon Kubler's seminal work, "The Shape of Time," referencing it in the footnotes. (Moneo, 1978) This acknowledgment suggests that Moneo has explored and finds value in Kubler's exploration of the evolution of human-made objects through time, including architecture. Moneo's interest in Kubler's work indicates a recognition of the importance of understanding architectural design as a dynamic process and makes him and his work a great specimen to study in this dissertation.

Moneo's own views on architectural evolution and iteration are evident in his approach to building design. Throughout his career, Moneo has demonstrated a deep respect for tradition and context while also embracing innovation and experimentation. He views architectural design as a dialogue between past and present, where each new building can be seen as an iteration of previous designs, obviously evolved and enriched by new technologies, materials, and cultural influences.

In Moneo's architecture, one can discern echoes of Kubler's concept of "prime objects" — foundational elements that embody the essential characteristics and values of a particular architectural tradition. Like Kubler's prime objects, Moneo's buildings often reflect a synthesis of historical precedent and contemporary expression, rooted in a deep understanding of cultural context and architectural heritage.(Kubler, 2008)

Moreover, Moneo's emphasis on the importance of place and context in architectural design resonates with Kubler's understanding of cultural production within specific historical and cultural contexts. Moneo's buildings are often sensitive responses to their surroundings, seeking to harmonize with their environment while also making a distinct architectural statement.

Moneo shows deep interest in architectural history. He uses his knowledge of architectural history to explore further compositions that generate complex perceptual phenomenon. Moneo keeps spatial experiences at the centre of his design practice.

MONEO'S NOTCH IN A STRING OF ITERATIONS

Rafael Moneo's architectural career can be aptly viewed as a significant notch in a string of iterations, wherein each new building he designs represents a modern iteration of traditional architectural forms. Throughout his illustrious career, Moneo has consistently demonstrated a profound respect for architectural heritage while simultaneously embracing contemporary expressions. Moreover, Moneo's acknowledgment of Sir John Soane's influence on his work underscores his recognition of architecture as a continuum, where each new building serves as a continuation of, and departure from, previous iterations. (Moneo, 2018) In essence, Moneo's architectural oeuvre stands as a testament to the iterative nature of architectural design, wherein tradition and innovation converge to shape the built environment for generations to come.

NATIONAL MUSEUM OF MODERN ART, MERIDA, SPAIN

The National Museum of Modern Art in Merida, Spain, stands as a striking testament to Rafael Moneo's architectural prowess, embodying a seamless fusion of traditional influences and contemporary innovation. Inspired by the classical architectural forms of ancient Rome, Moneo's design for the museum pays homage to the rich heritage of the region while simultaneously forging a bold vision for the future. At its core, the museum serves as the next step in the iterative evolution of traditional architectural typologies, reinterpreting classical elements in a modern context.

Figure 26: Integration of Roman ruins, Merida Museum, Spain

One of the most notable features of the National Museum of Roman Art is its deliberate integration of ancient Roman ruins into the architectural design. This integration creates a tangible link between the past and the present, inviting visitors to experience the continuity of history within the museum's walls. Moneo's decision to incorporate these ruins not only preserves the historical fabric of the site but also adds a layer of depth and authenticity to the museum experience. By juxtaposing ancient remnants with contemporary architectural interventions, Moneo blurs the boundaries between past and present, creating a dynamic dialogue between architectural eras.

Furthermore, Moneo's design for the museum exhibits a deliberate interplay between spatial volumes and flat planes, reminiscent of the perceptual paradoxes found in Sir John Soane's Art Gallery in Dulwich. Similar to Soane's manipulation of space and perspective, Moneo strategically arranges architectural elements to create a sequence of spatial experiences that unfold gradually as visitors navigate through the museum. The careful placement of arched doorways and sloping ceilings accentuates this perceptual ambiguity, inviting visitors to engage with the architecture on multiple levels. (Moneo, 2018)

Figure 27(left): Galleries of the Merida Museum
Figure 28(right): Galleries of Soane's Gallery, Dulwhich

In terms of spatial organization, the museum's plan reflects classical design principles, where each new discovery is revealed incrementally as visitors progress through the space. This deliberate sequencing of architectural features adds a layer of narrative complexity to the museum experience, transforming it into a journey of exploration and discovery. Additionally, Moneo's manipulation of space, particularly in the central axis of the museum, creates distinct spatial hierarchies that evoke a sense of grandeur and monumentality.

STOCKHOLM MODERN ART GALLERY

In a similar vein to his design for the Museum in Merida, Moneo's Stockholm Modern Art Gallery represents a contemporary iteration of traditional architectural forms, drawing inspiration from the classical typologies exemplified by Sir John Soane's Art Gallery in Dulwich. Moneo's design for the Stockholm Gallery echoes the principles of spatial manipulation and perceptual ambiguity found in Soane's work, albeit with a unique twist that reflects Moneo's own architectural vision. (Moneo, Levene and Fernando Márquez Cecilia, 2004)

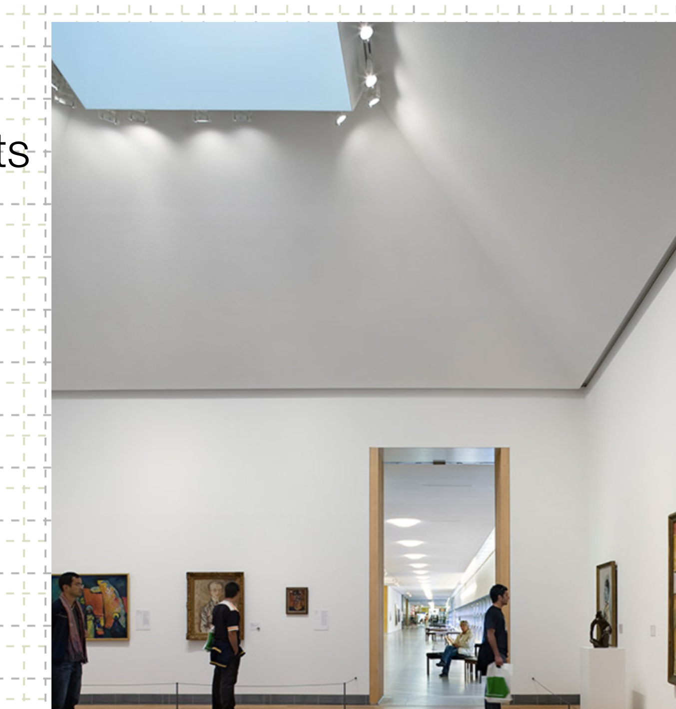


Figure 29: Stockholm Gallery Space, photographed under the pyramidal ceiling

At the heart of the Stockholm Gallery lies a series of prototypical square spaces with pyramidal ceilings, reminiscent of the smaller galleries found in Soane's Dulwich Gallery. However, Moneo deviates from the sequential arrangement seen in Soane's design, opting instead for a clustering of these spaces at varying sizes. This departure from a linear sequence transforms the museum experience into a dynamic encounter with spatial diversity, where visitors navigate through clusters of galleries, each offering a unique spatial configuration and atmosphere.

Crucially, Moneo relies on changes in scale to modulate the nature of the visitor experience within each gallery cluster. By presenting galleries of different sizes and proportions, Moneo creates a rich tapestry of spatial relationships, inviting visitors to engage with the architecture in multifaceted ways. The transition from one gallery to the next is seamless, with visitors simply popping through doorways to encounter a new spatial configuration, further enhancing the sense of exploration and discovery.

Moreover, Moneo's manipulation of spatial scale and arrangement serves to accentuate the monumentality and grandeur of the Stockholm Gallery, echoing the classical principles of hierarchy and proportion found in traditional architectural design. Each cluster of galleries contributes to a larger narrative of spatial progression, creating a cohesive yet dynamic museum experience that transcends the boundaries of time and tradition.

AUDREY JONES BECK BUILDING, MUSEUM OF FINE ARTS, HOUSTON

Moneo's design for the Houston Museum reflects a departure from the sequential arrangement seen in Sir John Soane's Dulwich Gallery and the clustered organization of the Stockholm Modern Art Gallery. Instead, Moneo introduces a new spatial paradigm characterized by a cohesive integration of diverse architectural elements and a nuanced interplay between light and shadow.

Moneo's design embraces the concept of fluid spatial transitions, inviting visitors to embark on a journey of exploration and discovery as they navigate through the museum's diverse galleries and courtyards. This dynamic interplay between interior and exterior spaces adds a layer of complexity to the museum experience, enriching it with opportunities for contemplation and interaction with the surrounding environment.

Moneo's design for the Houston Museum demonstrates sensitivity to the play of light and shadow. By strategically positioning openings, apertures, and skylights, Moneo orchestrates the passage of natural light throughout the museum, animating its spaces with dynamic patterns of illumination and shadow. This deliberate manipulation of light adds a layer of temporal richness to the architectural experience, transforming the museum's interiors into ever-changing canvases of light and shadow. (Moneo, Levene and Fernando Márquez Cecilia, 2004)


Figure 30: Houston Museum Gallery - Daytime Lighting

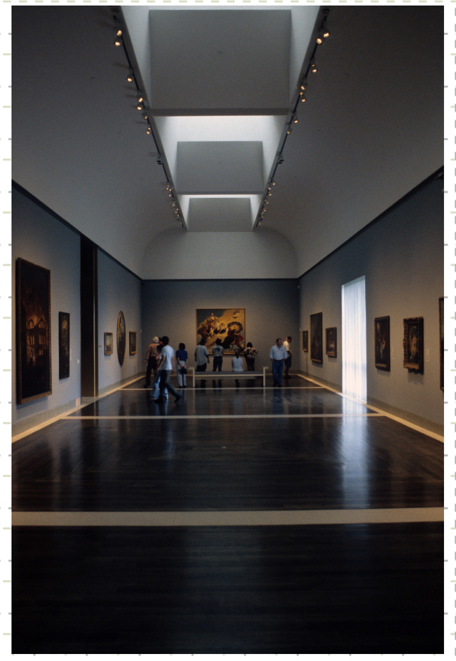


Figure 31: Houston Museum Gallery - Nighttime Lighting

ATOCHA STATION

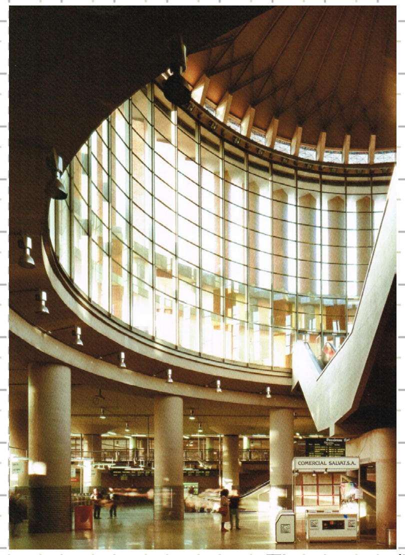
Rafael Moneo's Atocha Train Station in Madrid exemplifies his adeptness at integrating historical influences into contemporary architectural designs. Drawing inspiration from the circular central nave of the church of St. Vitale in Ravenna, Italy, dating back to the Byzantine era under Emperor Justinian, Moneo revisits a timeless architectural concept and infuses it with modern functionality.

Central to the design of the Atocha Train Station is the circular ticket hall, reminiscent of the spatial qualities found in St. Vitale's central space. As visitors approach the ticket hall, they are greeted by a perceptual illusion created by the architectural configuration. The roof above their heads appears to be cut out, blurring the boundary between the main central and low surrounding spaces. This effect tricks the mind into feeling like it is both outside when standing within the hall and inside when standing outside, echoing the spatial ambiguity observed in St. Vitale's architecture. (Evans, n.d.)

Photographs taken within St. Vitale's central space reveal the intricacies of its design, with balconies supported by freestanding columns curving inward at the perimeter. This architectural detail contributes to the sensation of being simultaneously inside and outside the central space, a perceptual complexity that Moneo intentionally seeks to replicate in his designs. By studying architectural history and reinterpreting typological conventions, Moneo imbues his projects with a unique spatial richness that challenges traditional notions of architectural typology.

In essence, the Atocha Train Station serves as a contemporary manifestation of historical architectural principles, seamlessly blending past influences with modern functionality. (Moneo and Andreotti, 1994) Moneo's thoughtful exploration of perceptual complexity and spatial ambiguity elevates the design of the station, creating an immersive architectural experience that resonates with visitors and commuters alike.

Figure 32: Atocha Station ticketing hall exterior



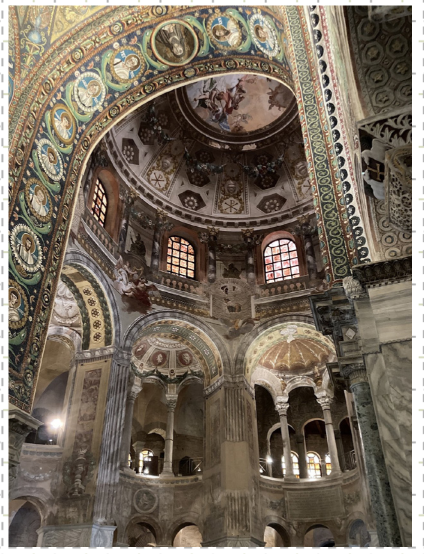


Figure 33(left): Inside the ticketing hall, outside the cylindericalspace

Figure 34(right): Inside St. Vitale, away from under the dome

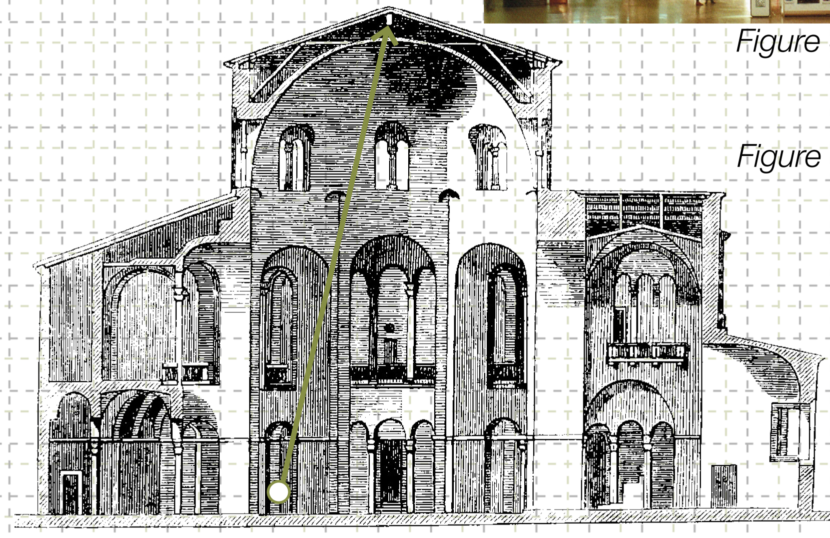


Figure 35: Section of St. Vitale illustrating deceptive viewpoints, annotation shows viewpoint of figure 34

KURSAAL CONGRESS CENTRE AND AUDITORIUM

Rafael Moneo's Kursaal congress center and auditorium in San Sebastian is a masterful exploration of architectural composition and site responsiveness, drawing inspiration from historical precedents such as Hadrian's villa at Tivoli. The El Croquis monograph on the Kursaal highlights the significance of the site and its integration with the surrounding landscape, both visually and experientially. Moneo's approach to site orientation and composition echoes Hadrian's technique of aligning key architectural features with prominent topographical elements in the distance, creating a dialogue between the built environment and the natural landscape. (Moneo, Levene and Fernando Márquez Cecilia, 2004)

At Tivoli, Hadrian strategically positioned architectural elements to frame distant vistas, drawing attention to the scenic beauty of the surroundings. Similarly, Moneo's design for the Kursaal employs compositional techniques to direct the viewer's gaze towards the sea and the mountainous backdrop. The placement of the two libraries or banqueting halls on a terrace overlooking the sea parallels Hadrian's Villa's alignment of architectural features with significant topographical features.

As visitors approach the Kursaal along the street front or the seaward walkway, they are subtly guided to perceive the landscape in relation to the architectural elements of the building. The alignment of the halls profiles with the slope of the mountain behind creates a visual connection between the built environment and the natural surroundings. Moreover, the presence of a statue atop the mountain, seemingly interacting with the architectural forms below, adds a layer of dynamism to the spatial experience.

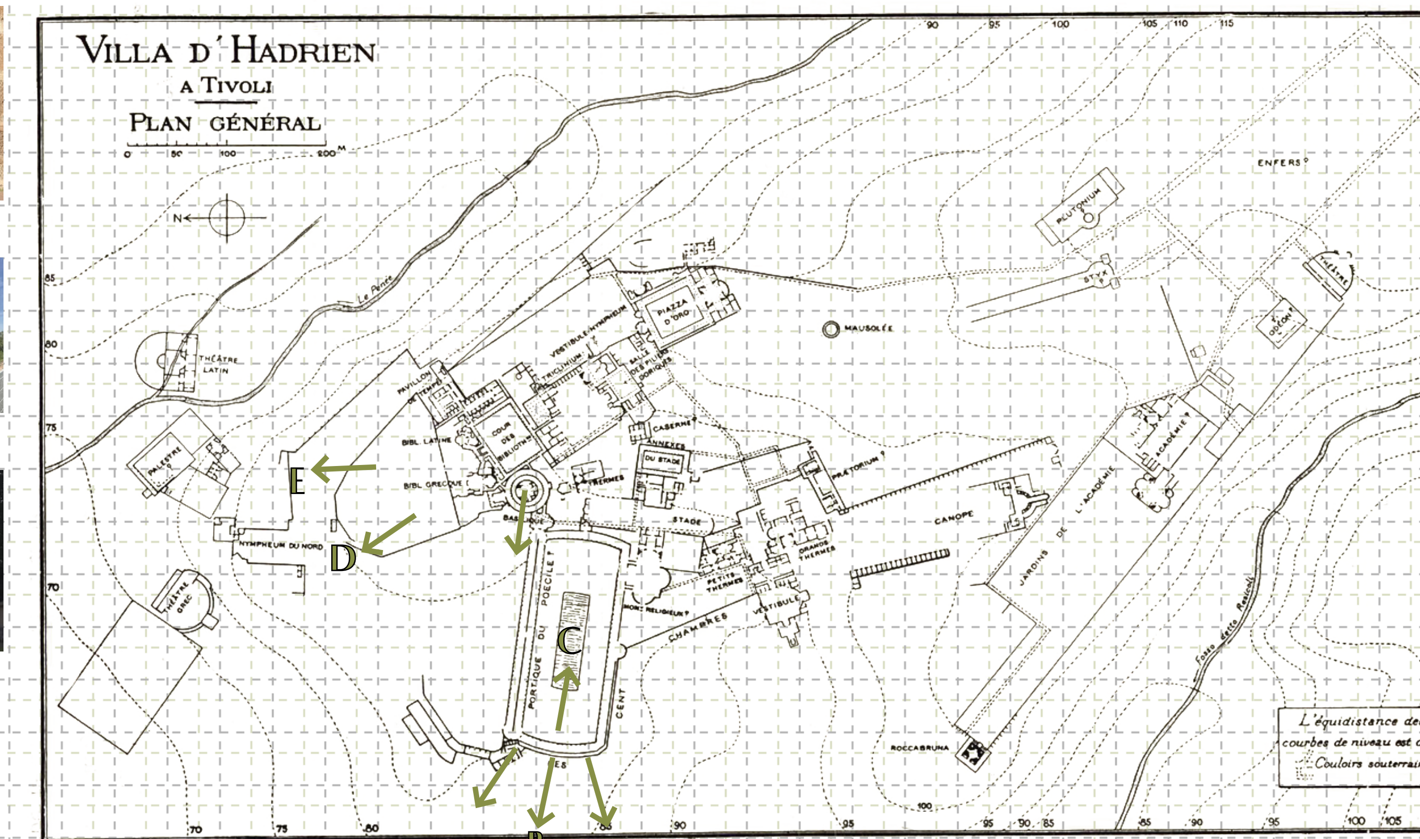
The Kursaal's design also incorporates perceptual illusions that enhance its connection to the surrounding landscape. From certain viewpoints, the parapet of the main hall appears to slope upwards, mirroring the incline of the mountain behind it. However, when sightlines are obstructed, the parapet may be perceived as horizontal, leading the glazing strips to appear wider towards the sea. This subtle manipulation of perception adds depth and dimensionality to the architectural composition, reinforcing the building's relationship with its natural setting.

In essence, Moneo's Kursaal represents a contemporary reinterpretation of Hadrian's Villa's architectural strategies, demonstrating a sophisticated understanding of site responsiveness and compositional harmony. By aligning architectural elements with key landscape features and manipulating perception to enhance spatial dynamics, Moneo creates a captivating architectural experience that seamlessly integrates with its surroundings.


A


B


C




D


E

Figure 36: Hadrien's Villa Plan with annotated view points and views

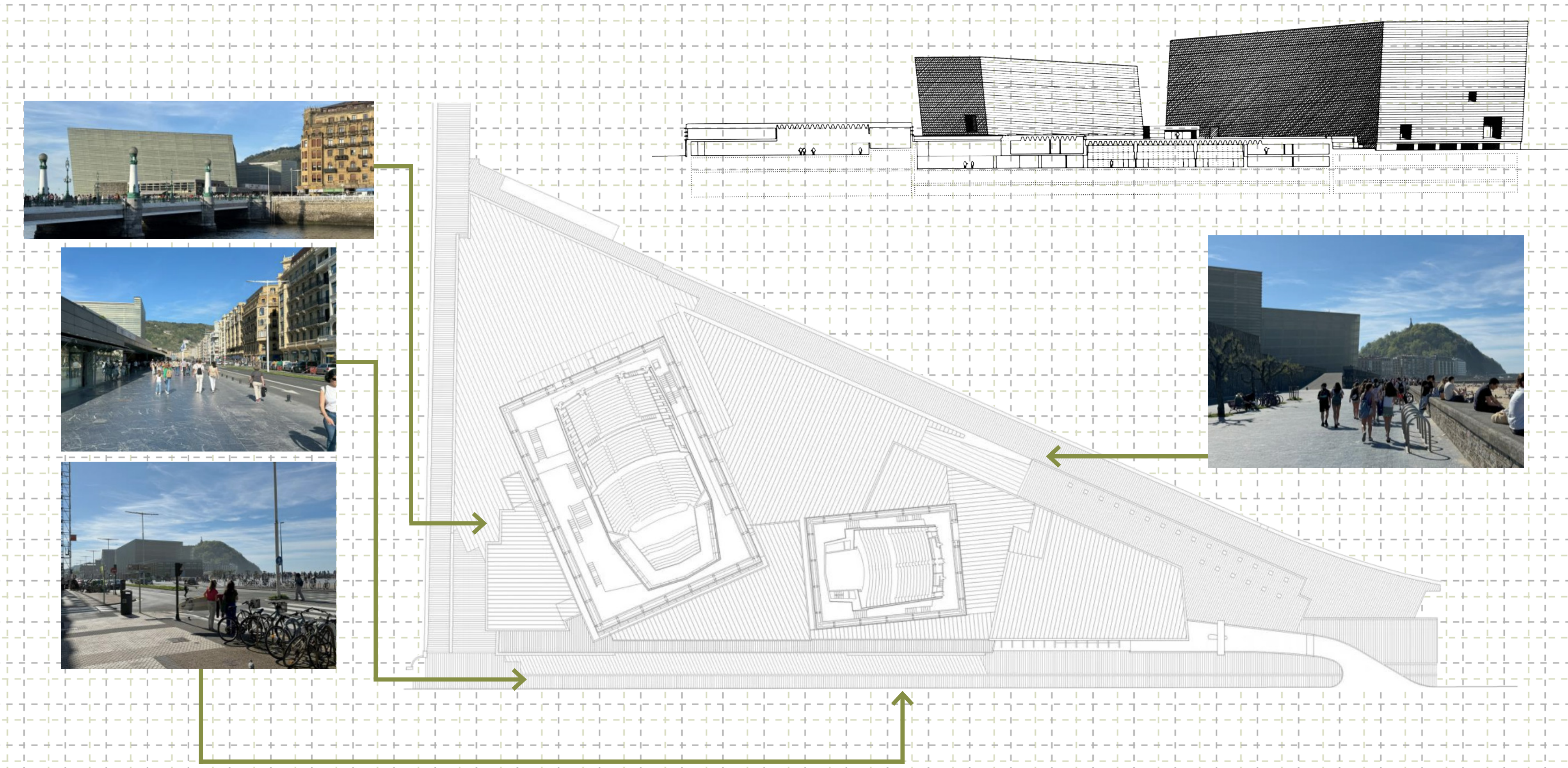


Figure 37: Kursaal Centre Plan and Elevation annotated with points of view

10 GEOGRAPHICAL ITERATION

MOSQUES TOWARDS MECCA

Studying geographical iterations in architectural design, particularly focusing on mosques facing Mecca, offers valuable insights into the evolution of mosque design over time. This common design problem, rooted in the fundamental requirement for mosques to orient themselves towards Mecca, serves as a compelling case study for exploring architectural iteration.

One remarkable example is the Great Mosque of Cordoba in Spain, originally constructed as a Visigothic church in the 6th century before being converted into a mosque during the Islamic rule. The mosque characterized by its unique prayer hall, featuring a multitude of horseshoe arches and columns arranged in a grid pattern. The reorientation of the existing structure towards Mecca involved strategic adjustments to the mosque's layout, ensuring that the prayer hall and mihrab (prayer niche) align with the qibla direction.

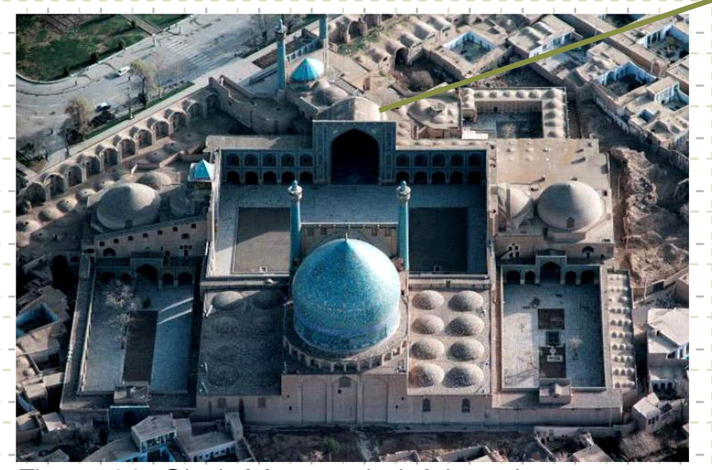
The Shah Mosque in Isfahan, also known as the Imam Mosque, presents a unique architectural solution to ensure that the entrance aligns precisely with the qibla while also accommodating the urban context of the site. Unlike many mosques where the entire structure is oriented towards Mecca in a linear fashion, the Shah Mosque exhibits a distinct departure in its design approach. Here, the entrance of the mosque is angled at a clear 45 degrees to the rest of the building, allowing it to face Mecca while harmonizing with the surrounding urban fabric.

In North Africa, the Great Mosque of Kairouan in Tunisia personifies the adaptation of traditional Islamic architecture to local environmental conditions. Built in the 9th century, the mosque's compact layout and central courtyard are designed to maximize natural ventilation and daylight while maintaining the qibla orientation. The mosque's distinctive minaret, adorned with decorative motifs and geometric patterns, serves as a visual marker of its alignment with Mecca.

In Southeast Asia, the Sultan Omar Ali Saifuddin Mosque in Brunei showcases a fusion of Islamic architectural elements with modern design sensibilities. Completed in the 1950s, the mosque's gleaming golden dome and marble-clad minarets stand in stark contrast to the lush tropical surroundings. Despite its contemporary aesthetic, the mosque's design meticulously incorporates the qibla orientation, ensuring that worshippers face Mecca during prayers.

Looking towards the future, the concept of The Line, a proposed linear city in Saudi Arabia, presents intriguing possibilities for mosque design and orientation. The linear layout of The Line, stretching over a vast expanse of land, poses unique challenges and opportunities for mosque architects. Even if identical mosques were constructed along The Line, each would have a distinct relationship with the city grid and its orientation towards Mecca. This underscores the iterative nature of mosque design, where spatial relationships and contextual factors inform the architectural iteration process.

Figure 38: Great Mosque of Cordoba, Spain



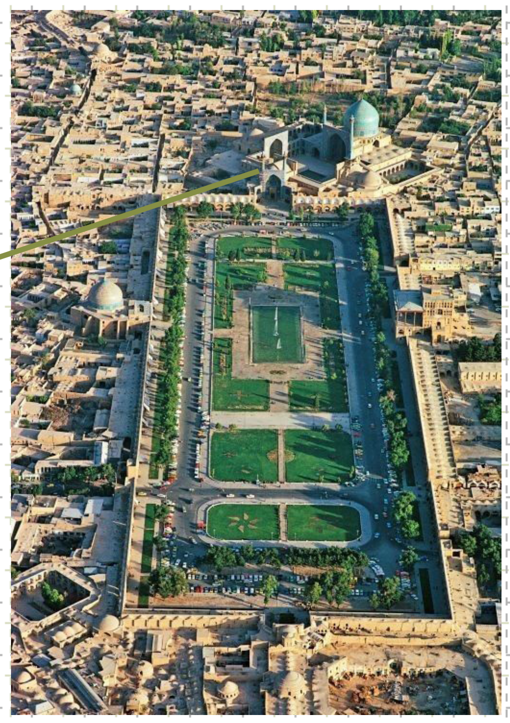


Figure 39: Shah Mosque in Isfahan, Iran

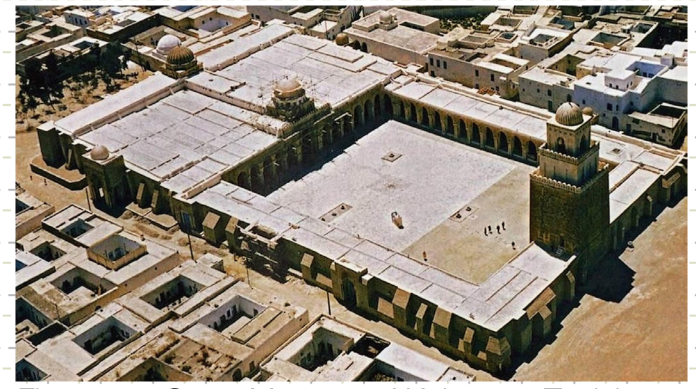


Figure 40: Great Mosque of Kairouan, Tunisia

Figure 41: Sultan Omar Ali Saifuddin Mosque

Figure 42: The Line - proposed, Saudi Arabia

ASTRONOMICAL ITERATION

In the case of the study of the Mosque's orientation towards Mecca, Mecca can be seen as a terrestrial target. In a similar but broader sense, the architecture of Astronomical Instruments can be seen as pointing towards a celestial target.

One such example is that of the Jantar Mantar astronomical complexes that are found around various cities India. At present, only the Jantar Mantar's in New Delhi and Jaipur are in a functional condition.

Due to the reletavely close proximity of the two cities, the astronomical iteration between the two complexes cannot be successfully studied due to similar astronomical markers. However, this still remains a viable strand in the study of architectural iteration that holds great potential to be explored further.

11 CONCLUSION

Throughout this dissertation, the concept of iteration has been explored in its multifaceted complexity. Iteration isn't a singular phenomenon; rather, it operates at different levels, across varying periods of time, and within diverse cultural contexts. By delving into the various strands of iteration, I've examined its manifestations and implications, shedding light on its nuanced role in architectural design.

From analyzing iterations within the framework of the RIBA Plan of Work to dissecting the iterative process within a single project, and from exploring the iterative evolution of a single architect's body of work, over through the collective contributions of architects, to examining geographical iterations on a global scale, this dissertation has traversed multiple layers of architectural iteration. Each level of analysis has offered unique insights into the iterative nature of design, highlighting the dynamic interplay between tradition and innovation, precedent and creativity.

Through this comprehensive examination, clarity as a designer has emerged. The understanding gained from studying the diverse aspects of iteration provides a valuable framework for future design endeavors. It reveals that creativity can thrive within the boundaries of tradition and precedent, offering a mechanism for generating new ideas while building upon the foundations laid by those who came before.

Rafael Moneo's approach to architecture serves as a compelling example of this iterative mindset. His commitment to adding onto existing architectural vocabulary, rather than starting from scratch, demonstrates how iteration can be a catalyst for innovation. By building upon the past and evolving architectural typologies, Moneo creates something new while maintaining a sense of continuity with architectural tradition.

Through this study of iterations, it is also clear that this is just a limited study into the extremely complex and multifaceted nature of iterations and all of these strands of iteration could be infinitely studied further.

In essence, this dissertation has elucidated the role of iteration as a driving force in the design process. It's not merely about repeating the same thing over and over again; rather, it's about engaging with the past, responding to the present, and envisioning the future. By embracing iteration at various scales and contexts, architects can navigate the complexities of design with clarity and creativity, ultimately shaping the built environment in meaningful and transformative ways.

12

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