The Principle of "Form-Meaning Integration" and the Optimal Balance between Efficiency and Quality—An Exploration of Design Methods Based on Balance Theory (Postprint)

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Abstract

Design is a continuously evolving and deepening process in which creativity and form constantly blend, collide, and ultimately achieve balance—this very process embodies design quality. The balance between efficiency and quality is emphasized differently across various design stages: during the initial phase, high efficiency is achieved through purposeful and rational information gathering, effective collaborative cooperation, independent focused thinking, and systematic data organization to draw conclusions from extensive research; during the development phase, emphasis is placed on the organic integration of form and meaning, grounded in cumulative conceptual summarization and personalized form-meaning analysis, utilizing diversified meaning-seeking methodologies to provide intuitive thinking pathways, and ensuring timely communication among project participants through a well-developed collaborative system, thereby improving efficiency while maintaining quality. While effective methods can enhance design efficiency, they do not alter the fundamental nature of design; only through continuous learning, practice, and reflection can outstanding works be created.

Full Text

The Way of "Form-Connotation" Integration: Optimal Balance of Efficiency and Quality—Exploration of Design Methods Based on Balance Theory

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Abstract: Design is a process of continuous development and deepening, in which creativity and form constantly blend, collide, and ultimately achieve balance—this is precisely the manifestation of design quality. The emphasis on efficiency versus quality varies across different design stages: the initial phase requires collecting and integrating vast amounts of information to draw conclusions, achieving high efficiency through purposeful collection, effective collaboration, independent concentrated thinking, and systematic data organization; the design development phase emphasizes the organic integration of form and connotation, building upon accumulated experience and personalized form-connotation analysis, employing diversified meaning-seeking methods to provide intuitive thinking pathways, and ensuring timely communication among team members through a robust collaborative system, thereby guaranteeing quality while improving efficiency. Good methods can enhance design efficiency without altering the essence of design; only through continuous learning, practice, and reflection can excellent works be created.

Keywords: Design Innovation; Design Efficiency; Design Method; Thinking Patterns; Generalized Design; Project Management; Collaborative Design

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Design is a process of continuous development and deepening, in which creativity and form constantly blend, collide, and ultimately achieve balance—this is precisely the manifestation of design quality. The emphasis on efficiency versus quality varies across different design stages: the initial phase requires collecting and integrating vast amounts of information to draw conclusions, achieving high efficiency through purposeful collection, effective collaboration, independent concentrated thinking, and systematic data organization; the design development phase emphasizes the organic integration of form and connotation, building upon accumulated experience and personalized form-connotation analysis, employing diversified meaning-seeking methods to provide intuitive thinking pathways, and ensuring timely communication among team members through a robust collaborative system, thereby guaranteeing quality while improving efficiency. Good methods can enhance design efficiency without altering the essence of design; only through continuous learning, practice, and reflection can excellent works be created.

Time node control is the most common and troublesome issue for young designers during the creative process. Inexperienced practitioners are typically assigned tasks of moderate volume and difficulty, yet consistently fail to complete them on schedule, resulting in low efficiency without achieving high quality. Experienced designers, despite handling numerous affairs at the design institute, rarely miss deadlines. In practice, project managers maintain overall control of project progress while participants strictly control their time to ensure tasks are

completed as scheduled.

This paper proposes ideas and suggestions for balancing efficiency and quality during the conceptual design phase, hoping to explore and address this issue with relevant practitioners. At first glance, "efficiency" and "quality" seem as incompatible as "fish and bear' s paw," seemingly unattainable simultaneously. In fact, achieving balance between them means attaining both. Under limited conditions, reaching efficiency and quality in all aspects is difficult. By studying formal methods for resolving contradictory problems—the Extension method—we can analyze this design contradiction to derive a set of methods that facilitate the balance between architectural design innovation and efficiency [1]. At different design stages, we can propose different requirements for efficiency and quality; from a macro perspective on the overall project progress, this yields both efficiency and quality.

Scheme design is a process of matching "form and connotation." Form, simply put, is pure space, the relationship with the surrounding environment, and results that can be derived through rational analysis. Connotation is motivation, experience, culture—a psychological phenomenon. The fundamental requirement of good design is achieving the integration of "form" and "connotation."

From the perspective of "form-connotation matching," we can summarize two design processes: "data-driven" and "concept-driven." The data-driven design process begins by collecting vast amounts of form and connotation from others, then filters and summarizes this information before starting to think about and establish one's own creativity and formal expression, continuously deepening and clarifying it. The concept-driven design process typically involves thinking about desired creativity from the start; once one has a preliminary connotation and immature form, one then purposefully searches for information to continuously deepen and clarify the work.

Regardless of which design process is employed, design improvement must pass through three realms: Realm One: collection and reflection on form and creativity; Realm Two: interaction and collision between form and creativity; Realm Three: organic integration of form and creativity. If we examine the design process through these three realms, our core problem can be redefined as: how to achieve organic integration of form and connotation at the fastest speed while guaranteeing quality. See Figure 1.

[Figure 1: see original paper] Balance of Form and Connotation in Design

1. Design Based on Balance Theory

From the collection and reflection of form and connotation to their interaction and collision can be seen as a process of understanding and exploring the scheme, whose core purpose is to fully understand relevant knowledge and comprehend scheme constraints without making any demands on the scheme itself. Therefore, essentially, this stage should aim at analysis and conclusion-drawing,

maximizing efficiency as much as possible. Improving efficiency involves several fundamental approaches.

2.1 Reasonable Data Collection

Broad collection and quick browsing should be important principles in the early data collection phase. A significant advantage of rapid browsing is that it allows us to review the maximum amount of information in the same time, avoiding wasting too much time on materials that won' t be used. For the data collection stage, a common question often arises—when to stop. We can solve this problem through the "layout first, fill later" method. Specifically, after establishing some logic and thinking, we first build the framework, then replace, modify, and deepen it. This is a progressive mode of thinking.

2.2 Purposeful Deepening

Hierarchical deepening is an important component of many methodologies, employing a hierarchical approach through "system-organization-unit" for development. Hierarchical deepening makes our work more logical and avoids detours. We can use the shortest time to stack relatively important matters, then select truly important ones from these for deepening, and finally extract the essence. Although this method doesn' t achieve comprehensiveness and systematic construction, it can clearly articulate the most important points.

2.3 Independent Concentrated Thinking

Instant thinking is a highly efficient mode of thinking—when inspiration comes, it should be quickly grasped and developed without waiting; once in the zone, it shouldn' t be easily interrupted. Independence in the design thinking phase is particularly important, which can be divided into temporal independence and spatial independence. Temporal independence means setting aside a vacuum period for thinking without interference from other trivial matters. Spatial independence is a distinction made for discussions, which can be understood as individual thinking—don' t waste too much time in endless and fruitless discussions with others. The key to concentrated thinking is that once you decide to design, you must calm down and avoid interrupting yourself easily.

2.4 Concise Output Expression

Expression is only for better communication of ideas. If there are priorities in deepening, there will naturally be priorities in expression. Highlighting key points follows several principles: say what matters to whom it matters; reasonable reporting structure; vivid and eye-catching expression; being concise and refined is the most direct approach. Excellent expression methods make communication twice as effective with half the effort. Standardizing an excellent expression method to form one' s own style can save substantial subsequent work time and avoid many detours.

2.5 Timely Accumulation and Summary

As human cognitive patterns change, new technologies emerge, and aesthetic requirements diversify, today' s design has transformed into an innovation of multiple and comprehensive concepts, reflecting an integrated and adaptable comprehensive philosophy. Against this background, design and accumulation-summary should have a "heterogeneous isomorphic" relationship. "Learning without thinking leads to confusion; thinking without learning leads to danger." Work is a continuous input process during which various problems and thoughts inevitably arise. Without timely feedback and summary, much information is often forgotten when reflecting after all work is completed. The moment when each stage' s task ends is when the gains are most complete, with the clearest thinking. Seizing this timing for summary and reflection often yields the greatest harvest and represents the optimal moment for accumulation.

The purpose of collecting and reflecting on form and connotation is to quickly find information helpful for one' s own creativity formation and deepening. This stage' s work should prioritize efficiency, focusing on accumulation and summary. Reasonable collection, purposeful deepening, and effective collaboration are effective ways to improve efficiency, while thinking and summary help designers extract effective information, improve work quality, and prepare for the next stage.

3. Balancing Form Refinement and Creative Expression—Quality

The process from interaction and collision to organic integration of form creation and creative expression is an exploration of "form-connotation integration."First, we need to clarify and refine our own creativity, finding appropriate forms to express this creativity. This stage is a crucial period for improving architectural design quality and often becomes a design bottleneck. However, employing suitable methods can help us guarantee quality while improving efficiency.

3.1 Efficient Storage System

The significance of accumulation goes without saying, but what we discuss here is effective accumulation. The purpose of effective accumulation is to enable designers to quickly recall previously accumulated information when needed. The key to effective accumulation lies in achieving high-quality output, which has two critical points: an easily extractable information system and high-quality information data.

High-quality information data possesses certain characteristics and represents excellent resources that can bring thinking to the design process, typically featuring completeness, uniqueness, and elitism. It should be noted that architectural design, as an interdisciplinary field, although not becoming a complete science, gains strong vitality through the rich trends and developments of other

disciplines [2]. Therefore, the information we collect should not be confined to architectural knowledge but should involve broad exploration.

Establishing one' s own storage system, from a learning perspective, enables information to be internalized and contains some inferable logic, facilitating our learning and extraction [3]; from an information science perspective, it defines a reasonable path enabling us to record and locate information more accurately. This is undoubtedly the foundation for rapid information extraction. Familiarity with accumulated information determines whether designers can quickly find appropriate information, and repetition is the best way to achieve familiarity. Repetition includes two aspects: repeated application and repeated supplementation and revision of the storage system. Repeated application is repeated stimulation of the accumulation loop of "recognition, coding, storage, and extraction." As time passes, our worldview or ways of understanding things also change, and supplementing and revising the storage system enables us to search for desired information faster and more accurately.

3.2 Personalized Form-Connotation Analysis

After a period of learning, architects develop certain thinking patterns and automatically classify the materials they see. At this point, we need to develop this classification method into a system of our own. However, to become a system, one must organize one' s values. The foundation of organization is classification, and the most basic form of classification is the tree structure. This process is a rigorous, rational process requiring the operator to maintain a clear mind at all times, not being swayed by the "connotation" of previously collected materials.

We conduct certain qualitative definitions of the collected materials, artificially adding some "search terms"to them in our own system. This process is a spiritual exchange with the material' s author—we understand the connotation the author wants to convey through the material' s form. Conducting personalized form-connotation analysis of collected materials deepens our understanding of them. When we can establish a storage system and incorporate the dimension of the relationship between form and connotation, our collected information gains an additional quality guarantee.

3.3 Diversified Meaning-Seeking Methods

Multidimensional problem-solving under a generalized design perspective adopts a generalized design view, based on the whole and essence, using multidimensional approaches to handle real problems to broaden our thinking [4]. Effective accumulation and personalized form-connotation analysis rely more on continuous organization to effectively compress design time. However, sometimes despite extensive preliminary work, there are still no ideas or no good solutions. Design bottlenecks are a difficult but necessary exploration process in design. The following methods are effective solutions for design bottlenecks:

(1) **Scenario Reconstruction and Experience Method**
Experience is the most personalized and seemingly most reliable source of creative ideas. Freud' s psychoanalytic theory states that creation is a process of "unconscious psychology"[5]. In the unconscious experience process, we can obtain creativity beyond the ego. By reconstructing certain scenarios, we can acquire certain profound experiences and gain inspiration. In addition to scenario reconstruction, obtaining inspiration from immediate experience is more explosive. We can borrow from hypnosis methods (yoga, meditation)—calming the mind, closing the eyes, deep breathing, establishing a scene in the mind, placing oneself personally in this scene, and wandering in it. In this imaginative immediate experience, we can be in the freest state, obtaining the most direct and desired parts in this unconscious state and achieving creative breakthroughs.

(2) **Important Detail Deepening Method**
Inexperienced architects often get lost in detail carving and lose control of the overall picture. A large part of this phenomenon is due to the lack of overall grasp of form and connotation. There are fewer restrictions when carving details, making ideas easier to realize. When encountering design bottlenecks, try following the natural law of learning—from simple to complex, starting from a scene, a space, or even a texture. When simplicity accumulates to a certain extent, there may be different breakthroughs.

(3) **Return to Core Thinking Method**
As excellent architects, we need to consider all aspects, but when too many constraints force us to choose between comprehensiveness and excellence, we may need to make trade-offs. When encountering bottlenecks and stagnation, confront your inner self, ask yourself what you most want to express, find the core of the architecture, and then work with concentrated focus. This makes the work flow more smoothly, and the final result will not disappoint. In today' s digitally advanced era, we face more opportunities, but timely return to the origin of design will allow us to go further and more steadily in this design world [6].

The process of form-connotation integration is the most important and most problematic link in the design process. Many designs shine brightly in the early stage, gaining much attention and praise, yet the final results are unsatisfactory and regrettable. The problem lies in the failure to grasp the opportunity to improve architectural design quality at this stage when more constraints are added. By applying personalized form-connotation analysis to efficiently accumulated, easily extractable, high-quality information data, we can provide a basic guarantee for scheme deepening. Diversified meaning-seeking methods help architects find more solutions to improve design quality while ensuring that high-quality preliminary creativity is not eroded.

4. Collaborative System—Management of Efficiency and Quality

With technological development and social division of labor, traditional design models are gradually shifting toward complex system transformations driven by multi-disciplinary and multi-field collaboration. Architectural design increasingly relies on teamwork. To cope with increasingly complex design and construction systems, collaborative design has become an inevitable trend of the times [7].

4.1 Establishing Collaborative Systems to Ensure Efficiency

A collaborative system essentially solves the problem of how different professionals and operators within the same profession can work together in an orderly fashion. Projects in design institutes are usually executed on local area network servers, facilitating relevant personnel to read and modify, which simplifies conversion time in cooperation and reduces time spent on repetitive tasks. Clear division of labor in collaborative systems can avoid work duplication and uneven labor distribution, maximizing the avoidance of human resource waste. With a mature schedule, project progress can be ensured to advance smoothly. As long as everyone completes their assigned work within the stipulated time according to the plan, the project remains in a state of continuous advancement—this is also an important way to ensure efficiency.

The fundamental purpose of establishing a collaborative system is to simplify problems and enhance cooperation efficiency. From this perspective, a reasonable collaborative system should meet several conditions: unified standards, reasonable division of labor, and clear division of labor.

(1) **Unified Standards**
Everyone in cooperation has their own system, requiring others to understand your system before they can communicate. However, if we have unified work paths, unified drawing depths, and unified expression styles before communication, we can save substantial time while providing convenience for subsequent related work and facilitating further deepening.

(2) **Reasonable Division of Labor**
In theory, "utilizing everyone' s strengths" is the highest manifestation of cooperation efficiency. To achieve this level, project leaders at least need to understand team members' capabilities and attitudes toward different tasks. This makes the entire team relatively stable, reduces complaints, and improves both work efficiency and quality.

(3) **Clear Division of Labor**
After grasping the reasonableness of division, we can easily assign appropriate work to the most suitable people. However, unclear division leads to team members losing direction, wasting time on irrelevant matters, and causing resource waste. Overly clear division may damage members' ini-

tiative. The criteria for clarity should at least satisfy: reasonable timeline, clear work hierarchy, avoiding overlap, and full understanding of tasks.

(4) **Flexible Division of Labor**
Clear division aims to minimize task overlap but doesn' t equate to rigidity. We can assign the same task to several people simultaneously, then select the best outcome or synthesize the essence from different members' results. Similarly, one person can have several tasks simultaneously. In the early design stage, each member should try different tasks to increase mutual understanding, benefit team harmony, and serve as a good way to determine task reasonableness, reducing the risk of task crises during later deepening.

4.2 Updating Collaborative Systems to Improve Quality

Scheme design has no absolute or ultimate solution; it is an architects' "problem-solving" process when facing a series of uncertainties, instabilities, non-uniqueness, and value contradictions. Therefore, design yields a "satisfactory solution" rather than an "optimal solution" [8]. This is a process of balancing efficiency and quality, a result of matching creativity and form. Preliminary data through reasonable, purposeful collection, effective collaboration, and concentrated thinking and organization can achieve absolute efficiency. Scheme deepening is the critical juncture for balancing form and connotation, truly a case of "success or failure depends on this." Efficient storage systems and personalized form-connotation analysis lay a good foundation for scheme deepening and provide more possibilities for form-connotation integration. Diversified meaning-seeking methods provide architects with rich thinking paths more intuitively and effectively. Systematic data organization methods and perfect collaborative systems provide more powerful support for continuous project advancement and communication among project participants.

The collaborative system itself is a database that accommodates different interpretations of architectural spatial form and connotation by participants from different professions or the same profession. Therefore, the collaborative database is a diverse yet refined "form-connotation repository," which constitutes the core competitiveness of the design team. As design is not accomplished in a day, establishing a collaborative "form-connotation repository" cannot be completed overnight. To improve design quality and the team' s overall competitiveness, updating and refining the database are particularly important. We believe the updating process mainly involves:

(1) **Timely Communication and Feedback**
The accumulation of collaborative systems comes from participants' accumulation. Only when participants are willing to share and feedback can the collaborative system thrive. Team leaders should encourage designers to refine their understanding of architecture at different project stages and share it on the collaborative platform. Collective wisdom often creates

better designs.

(2) **Continuous Summary and Improvement**
As a system, the shared database should be inclusive while maintaining certain classification standards to facilitate the extraction and transformation of "form and connotation." Therefore, system managers should classify and integrate designers' independent "form-connotation perspectives," continuously absorbing and updating relevant content to make the entire system clearer and more refined.

Collaborative systems provide an excellent communication platform for coordination among all parties in a project. More and more large-scale projects are placing increasingly high demands on collaborative systems and platforms, with various domestic and international platforms successively launching collaborative system platforms at different levels, which are gradually integrating into project engineering management systems. Meanwhile, we are also noticing that traditional collaboration models are quietly merging with more advanced digital constructions [9]. Through a perfect collaborative system platform, efficiency and quality can be more conveniently managed to produce high-quality design outcomes.

Although this paper provides many effective methods and theories for achieving balance between form and connotation, truly becoming proficient in balancing form and connotation, efficiency and quality is a process requiring continuous practice and summary.

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Note: Figure translations are in progress. See original paper for figures.