

## WHERE ARE THE DESIGN METHODOLOGISTS?

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ABSTRACT:

Methods still attract both confusion and dissension in design. "Design" and "method" are defined in order to carefully locate meaning in the following discussion. A brief reflection on the history of design methods, precedes reasons for supporting this investigation and reasons resistant to such work. An analogy is drawn to other domains such as thermodynamics, now thoroughly established with a useful body of knowledge, that originally suffered from the resistance of practitioners to codification of knowledge about the domain. An anatomy of method is offered that describes its key features and indicates possible areas for generation of new or improved method, given the changing context of design performance. The essay argues that developing methods that are explicit, useful and whose efficacy can be measured is essential for the development of design as a discipline.

Do you know one? A design methodologist, I mean. You know, a professional or academic who is concerned with how design is done in addition to doing design. Do you know of anyone who makes a conscious act to select a particular approach to working through a design problem? By this time in the development of the discipline, most designers should have a thorough education in design methods and apply them regularly in practice. There were a good number of methodologists in the 1960's representing numerous design disciplines including architecture, product design, city planning and others. Yet, the discussion at the 2003 2byTwo Conference gave the impression that design methodology is still just emerging or at least that it remains on the periphery of academia and practice. Have design methods skipped a generation? Has the postmodern backlash to modernism submerged methods along with high modern expression? Has technological support for design processes cheapened thinking? Attendees in the conference session on methods were there to present their current experiments with methods, how they taught methodology and to just see what was going on in design methods today. For someone who has been immersed in the development, practice and rhetoric of design methods for over fifteen years, the state of affairs, as much as it could be characterized by the interactions at the 2byTwo symposium, was certainly striking.

In this paper, I attempt to explore why design methods seem to remain a contested possibility in the field. I draw on some history, look critically at the culture of design and seek analogies from other fields. My ultimate goal is to break down some of the apparent barriers and misconceptions about design methods and sketch out potential ways of encouraging their development and adoption as a normal part of design research and practice.

## Definitions

There are two important definitions with which to begin. They are “design” and “method.” I use the term “design” in this paper in much the same way as Herbert Simon who I paraphrase here: “Design is devising courses of action aimed at turning existing situations into preferred ones” (Simon, 1996). Design, as it is used herein, is intentionally broad and encompasses any discipline whose goal is to create new artifacts and systems. The particular fields of design that are normally implied by the attendees of the 2byTwo symposium and perhaps by readers of *Visible Language* are design fields generally interested in visual solutions that mediate the relationship between artifact and human user: communication design, information design and industrial design. Throughout the paper, the term “human-centered design” or HCD will be used when referring to the fields of communication, graphic, product and environmental design. Design will be used in its much broader sense.

The definition for “method” is: “A means or manner of procedure, especially a regular and systematic way of accomplishing something.” Methodology means: “A body of practices, procedures and rules used by those who work in a discipline or engage in an inquiry; a set of working methods” (American Heritage® Dictionary, 2002).

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“Design is devising courses of action aimed at turning existing situations into preferred ones”

(Simon, 1996)

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So “design methods” would be concerned with the body of practices and procedures that designers regularly use to turn existing situations into preferred ones. Said in this way, design methods seem concrete and downright necessary. It doesn’t seem as if it is open to debate as to whether design methods exist or not. They exist by definition because designers have regular and systematic ways of accomplishing what they do. What is open to debate is whether we know much about those practices. Are HCD methods studied, documented, shared and published? They certainly were in the late 60’s and early 70’s. And they are today, but not nearly in the scale that is probably necessary to grow the HCD discipline at a healthy pace. Human centered designers remain highly skeptical of methodology. This is due partly to deeply held beliefs as well as lack of knowledge and understanding about what methodology is and can bring to a discipline.

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## | Dead or Alive? |

One can barely think of HCD methods without thinking about the design methods movement in the 60’s and 70’s. Significant practitioners and researchers included John Chris Jones, Christopher Alexander, Geoffrey Broadbent, Bruce Archer, and A. D. Hall. The Design Methods Group, founded in 1966 in Canada by Gary Moore, then an architecture student at UC Berkeley, and Marvin Manheim at MIT contributed to this movement. Throughout the late sixties and early seventies this movement’s rise and fall and long-lasting negative perceptions among the human-centered design community may be one reason methods remains on the periphery. The leaders of this movement contributed theory, methods and example applications of methods for design. *Notes on the Synthesis of Form* (Alexander, 1970) and *Design Methods* (Jones, 1992) stand as seminal works.

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This era of methods development seems to have gained too much momentum on the promise of computational and algorithmic solutions to complex design problems. Similar to our recently experienced boom and bust economy of ideas and businesses based on the Internet, the excitement of a new class of technology inflated the claims, goals and expectations of design methods and what they could help mankind achieve. In his preface to the second edition of *Design Methods*, C. Thomas Mitchell writes:

Though design methods became for a time a popular subject, the movement did not have the effects Jones had hoped for. Some of those who adopted the new methods took design to be a completely rational, explicable process and used the methods as pretext for excluding intuition all together (Jones, 1992, xi).

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Jones continues,

We sought to be open-minded, to make design processes that would be more sensitive to life than were the professional practices at the time. But the result was rigidity: a fixing of aims and methods to produce designs that everyone now feels to be insensitive to human needs. Another result was that design methods became more theoretical and many of those drawn to the subject turned it into the academic study of methods (methodology) instead of trying to design things better (1992, xi).

It is a well-known result of this emphasis on algorithmic design methods that both Jones and Alexander rejected their early work and began exploring more intuitive and human-oriented approaches to design. This was not a rejection of design methods per se, as many will argue, but a rejection of deterministic searches facilitated by computation. It is worth asking what the evolution of design methods would have been if this early era had not been intermingled with the emergence of computing. Certainly, operations research, whose interest is the application of advanced analytical techniques to help make better decisions and to solve problems, benefited tremendously from the design methods movement and the association with computation.

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In spite of this well-known failure of new methods for HCD, are there other design methods that have emerged that are more aligned with actual HCD practice? Actually, the contemporary landscape of design methods is alive and well if one adjusts their viewpoint to include the broader definition of design mentioned earlier. While perhaps not spawning directly from the work of the early methodologists, design methods are being developed, published and taught in a variety of fields. There are methods for assessing user needs, establishing requirements, evaluating concepts and designing new products and services. A significant number of methods have been developed by the human computer interaction community, including the cognitive walk-through, heuristic evaluation and low-fidelity prototyping. In design engineering, there is Quality Function Deployment (QFD), Theory of Inventive Problem Solving (TRIZ) and the Design Structure Matrix (DSM). Design for Six Sigma (DFSS) is establishing momentum, which is a collection of the methods above, whose aim is to ensure robust and reliable design and development processes.

Many of these methods are based in disciplines far more comfortable with the role of science, math and engineering than the visual, human-centered design disciplines. But one cannot deny that the goals and problems these methods are attempting to address coincide with goals and problems of HCD. A common theme throughout the literature evaluating these methods cites the lack of understanding available from the sciences and engineering in helping to address real-world design problems. However, all of the methods cited above, and there are many more, benefit from a community of professionals and academics who vigorously pursue their development. Does the community of HCD lack the shared background, understanding and critical mass to research and develop new HCD methods?

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## Methods, theory and the development of a discipline

The term “method” is often associated with other concepts equally questioned and critiqued by the HCD community as to their value; theory, research and the scientific approach. Are methods an attempt to make HCD more scientific, more rational? Are methods only useful for the kind of design that includes research? Can methods really be employed to be a more effective communication designer?

Anyone interested in these questions and indeed theory, method, tool and principle are concerned with the state of the design discipline overall. Professor Emeritus Charles Owen of the Institute of Design argues that the development of methods, basic principles and theory are at the foundation of any formalized discipline (Owen, 1990). A formalized discipline is one that has a body of knowledge that is explicit, can be critically assessed and built upon. Without a body of knowledge an area of practice is considered a craft. Within craft traditions, there is little shared knowledge about how and why things are the way they are. There is considerable knowledge, however, and it exists inside the craftsman’s head and it is embodied in the resulting work. To maintain this knowledge, masters train apprentices in the craft.

A field emerges from a craft as knowledge is externalized, shared, evaluated and refined. Knowledge expands from what is done to why it is done. With a growing body of knowledge, more questions are asked, more research conducted to answer those questions and more understanding developed. Theoretically, this allows the discipline to expand into new areas of inquiry, new applications and more reliable practice.

A field or body of knowledge is built, verified and changed through the activity of research and publication. HCD as a discipline has a relatively small body of knowledge due to its limited tradition in research. One will find that in many other disciplines there are one or more “research traditions.” A research tradition often has one or more founding figures whose original theory, methods and results form the basis of an ongoing line of inquiry.

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Without a strong research tradition, HCD has had trouble building a critical mass of academics and researchers who reference and build upon a base of knowledge. HCD seems challenged as a discipline to study itself and its applications in order to build knowledge about itself. A recurring discourse in design is whether the practice of design itself can be considered research. This doesn't make sense since practice, or the doing of design, has completely different aims than the study of design. Certainly practice can be studied to form the basis of data collection in a particular research project, but in this case, the researcher and practitioner remain separate entities. And they have different goals.

The purpose of practice is to address a specific design problem. The result of practice is a completed project, a design. While one may add to one's personal knowledge and experience, there is no building of the discipline's knowledge through practice. Books about design practice are picture books, cataloging the many individual results of design practice. The purpose of design research is to develop knowledge. The result of design research is theory, principles and methods. They are generalized so they can be applied to multiple situations, multiple design problems. This is how other disciplines work. It is how the design discipline should work.

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Why has HCD taken so long to begin building knowledge? Why is it still debated whether knowledge building in HCD is possible or desirable? Actually, this pattern is common to all fields – what begins as craft, evolves into professional practice and finally begins to develop a field. It seems that HCD, however, has held out for quite a long time. Marketing, computing and human computer interaction – all are contemporaries to HCD. Each of these fields has roughly a fifty to seventy-five year history or less. Each of these other areas has evolved into full-fledged fields supported by a community of practitioners, researchers and university programs. Journals, conferences and research consortia exist not only for the topic overall, but any number of sub-topics and specialties. In HCD, by contrast, there are few scholarly journals, Ph.D. programs or vibrant sub-topics of research and development.

All fields must go through this evolution, starting as nothing more than practice and eventually enjoying full-fledged academic and practitioner communities. Early in the history of many fields, practitioners have resisted this evolution because it is never clear that it is possible to know about how things work. It is argued that understanding the complexity or subtlety of the field is impossible or would not prove to be useful. Thermodynamics, the branch of physics that deals with the characteristics and dynamics of heat, is the latest field for which I have found this pattern recounted in *The Principles of Design* (Suh, 1990). Suh developed an approach to mechanical design based on axioms and presents it in this work. Axioms are general statements that cannot be proven, but for which there exists no counter examples. Newton's laws of motion are axioms. In the introduction to his book, Suh makes a compelling case for how knowledge must be built in any field if it is to perform beyond what craft practice allows. Knowledge, grounded and developed from research, opens up new vistas of exploration and application. It makes a field more vibrant, creative and useful.

In many fields of science, empiricism and technological needs have always preceded the development of the science base, ranging from mathematics (von Neumann, 1961) to thermodynamics. This is best illustrated by examining the development of steam engines as a technological solution to meet a specific societal need, and the subsequent research work that led to thermodynamics as a scientific discipline. From the early to mid-nineteenth century, there were many attempts to develop steam engines. In those days, the axioms of thermodynamics were not established and designers therefore had to try many different ideas without the benefit of thermodynamics. Each inventor developed various engines by trial and error, and claimed that these engines were better than the rest. There was no way of distinguishing the advantages of one design over another without actually building the system and testing it (Suh, 1990, 15).

The similarities should be apparent to current claims in HCD about ease-of-use or better performing interfaces. What are the fundamental principles that underlie interaction? How do we characterize and measure interactive qualities? What are viable ways of assessing performance and comparing potential solutions? These are just a few of the many hundreds of relevant questions that should be asked and researched in the HCD community. Research produces knowledge. This knowledge would not seem mysterious or irrelevant, but useful. It would result in the wider use of HCD across industry as the benefits and value of the discipline became clear. The reliability of design activity would increase.

Suh continues:

This chaotic method for developing energy-conversion devices might have persisted to this day had it not been for the conceptual contributions made by Carnot and Joule during the latter part of the nineteenth century. They proposed the underlying fundamental processes involved in steam engines...These principles established the concept of energy and entropy in a fundamental sense, and provided the tools with which to eliminate perpetual-motion machines from consideration at the design stage...These laws largely eliminated unfruitful arguments over the merits of many energy-conversion devices through the establishment of a theoretical base (1990, 15).

Another example of the technology-driven field that led to the science base is the communication field. The need to communicate led to the invention of telephones, which in turn led to an information theory, which has had profound impacts on many other technologies (1990, 15).

Where would we be if medicine, biology, social science and psychology all maintained the belief that research and development of knowledge and new methods for practice in these areas would not be useful?

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Methods are not mysterious.  
They are beneficial to the growth of a discipline.

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## Anatomy of a design method

Methods are not mysterious. They are beneficial to the growth of a discipline. They do not eliminate the need for design expertise, but rather extend it. Let's shift our focus to methods per se. Of what do methods consist? Recall the definition we started with earlier: "A means or manner of procedure, especially a regular and systematic way of accomplishing something." This definition of a method focuses our attention on the procedural aspects of a method but it doesn't really help us decompose other descriptive dimensions. These other dimensions demonstrate that the elements and architecture of design methods is far richer than a simple procedure. The quality and scope of each of these dimensions of design methods also remain to be explored.

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### Stage of the design process

The design process provides the first organizing scheme for methods. A design method exists to support one or more of the design process steps generalized here as: 1) understand the situation; 2) structure criteria; 3) explore alternatives; 4) evaluate and refine concepts; and 5) execute the design. This 5-stage design process can be considered a general purpose method in of itself. Many design teams operate from less structure, often taking the problem as described, ideating and presenting concepts. Calling out the need for understanding and structuring the criteria of a problem leads to a more considered design process and a higher quality result.

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Each of the phases of the general design process described above provides a large area in which to create and apply new design methods. For example, a method such as ethnographic interviewing (Spradley, 1979) applies to the first two stages where understanding of a user's context can provide essential insight and new criteria for design. Paper prototyping (Snyder, 2003) applies to phases three and four and is an emerging method for embodying design ideas quickly to better understand interactive relationships. So it can be reasoned that any given design method may apply to one or more phases of the overall design process. Conversely, each particular phase of the design process provides a broad landscape in which new methods can be created to improve the quality of results.

#### Goal in using the method

A design method exists to augment our capabilities and to help the design team move from an initial state to a more desired state. A design method should make its purpose and potential benefits clear through the articulation of its goal. Often, the goal of a method is limited in comparison to the goal of the design program overall. The general goal of "a better design" does not provide enough detail to guide application of a method. A cognitive walkthrough (Dix, et al., 1993), for example, is used to quickly develop a large number of considerations during the development of an interface. The method is used to generate far more considerations than an individual could do alone. Its goal does not include evaluation and resolution of all issues identified. The goal of many HCD design methods often claim or propose too broad of a goal. By narrowing the focus and fostering a better understanding of the mechanisms at play, a deeper understanding can develop. This deeper understanding can then lead to general principles applicable across design projects.

One example of this is show-and-tell interviewing. A show-and-tell interview is a specific kind of ethnographic interview, which in turn, is a specific method within user-centered research. Show-and-tell interviewing requires the participant to show and tell the interviewer about the things they have at hand and what role they play in their daily activities. This particular focus on showing and telling led to the development of the concept of “invenstories,” highlighting the value of the particular stories people tell while they are accounting for the artifacts that exist in their environment. Invenstories have since been used to elicit stories about a wide range of particular artifacts like wallets, office desks and garages.

#### Activities or steps

The activities of the method and how they unfold are the most common aspects of a method that are described. Activities are the meat of the design method – what is actually done as work. There are activities to prepare for the method, to conduct the method and to create results. The order of activities can be described such as those that are sequenced, concurrent and iterative. General parameters can be given for conducting an activity such as how long it should take, who is involved and the objective of that particular step. Generally, steps in a design method can be thought of as analytic or synthetic, convergent or divergent. But there is no need to make these mutually exclusive. Sometimes the creation of a large number of ideas and their immediate evaluation to select one or two is necessary. The collection of data or information can be thought of as a divergent process since the goal is to develop a body of content that can then be analyzed. Analytic processes include such things as evaluating concepts or searching for patterns in data. This is a simple, but limited example of how we can start describing the activities that comprise design methods to better understand them. A typology of activities in design methodology would be a helpful research project which would improve our understanding of design methodology per se.

### People and roles

It is surprising how few methods make mention of the skills required of participants in the method and the roles they will play. A method does not guarantee that anyone can do it or that everyone in the group will play a similar role. Perhaps leaving out desired characteristics of the people executing a method drove some of the humanity out of the process. Certainly a lack of organizational structure among the participants in a method can leave the individual's purpose and contribution ambiguous at every step. Even a very simple method like brainstorming calls for a facilitator who must play a defined role in order for the quality of the method to be maintained. The need for clarity should be apparent regarding how people participate for methods that involve multiple steps and multiple people with different backgrounds.

### Content or subject matter of the method

Methods work with the content of the design problem. Example content is the activity that the users of the new design engage in, components of the design itself and technical data. The content of a method is not, however, just that which is related to the design itself. There is content that is developed to execute the method, content generated by application of the method and content that results from the method. A topic guide for a behavioral interview is an example of content that needs to be created for the method. Alternative mockups are an example of content created during the methods application. A recommended set of criteria could be the result of successfully applying the criteria. Any given content might perform different roles depending on the stage of design. The content that results from an earlier method might be the content used to perform another method.

A particular advantage designers have in applying methods is that they can represent content in more effective ways than others. A well-designed diagram, using variables of the visual field to encode relevant information, can greatly improve a team's ability to identify and discuss relevant issues. A more clearly designed questionnaire can improve response rates and the quality of the information received.

#### Principles and conditions of application


Principles and conditions of application help methods retain their relevance despite a changing application context. The "Comments" section that Jones included in *Design Methods* is a good example of this dimension. "Difficulties in using this procedure are..." (1992, 328). Principles tell us something useful about the relationship between the abstract representation of the method (its description) and what tends to happen in use as its activities are actually played out. Again taking brainstorming as an example, it is known from its frequent application, that one-hour is somewhat of an upper limit for productivity. A brainstorm tends to digress into conversation after this time period because of the intense mental energy needed to ideate, listen and respond. In addition, many brainstorms start out slowly, increase in tempo and then die down. Understanding this simple pattern helps the facilitator and the participants to execute the method. Without this understanding, suggestions from the group often arise for what should be done differently because there is ten minutes of relatively little idea production at the beginning of a brainstorm. This can be systematically avoided when one can explain the method and facilitate its successful implementation. Finally, principles and conditions of use can be developed for different domains of application. Certainly systems furniture presents different challenges than medical devices at numerous levels. A designer building their expertise in a certain domain has the potential to deepen and refine the application of general methods for that specific domain, increasing the quality and value of their work.

All of the above dimensions demonstrate the richness with which design methods can be developed. Methods are not sterile algorithms that process design data and produce an answer. Methods are approaches to design problem solving, applied in specific contexts that provide reliable and transferable results. A design methodologist is a designer with all the same responsibilities as a designer of communications or products. She must understand the context of the method, be sensitive to the needs of the people applying it, successfully organize the elements of the method and seek to understand issues that arise in its implementation. Design methods can and should be as satisfying to design as a communication system, an airport terminal or a garden tool.

## | The purpose and value of methods |

It was mentioned earlier that a method is used to augment the capabilities of the designer. Methods serve other purposes as well. They expand the kinds of problems to which design can provide value. Methods are necessarily general – they can apply to a wide variety of content. As a designer is faced with a problem with which she has little experience, methods provide a means to bridge prior experience to the new problem. I recently completed the mentoring of several student interns on a project to understand the effectiveness of some new furniture components. While never having done an evaluation of contract furniture, my methods of establishing target questions, observing and engaging users as well as data analysis and the development of implications for other kinds of products served as the foundation for this work. There are limits, of course, and no method can make up for experience with the specific content of a particular context.

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Methods improve the pedagogy of design. When “regular and systematic ways” of designing are documented, the design instructor has a structure and approach to teaching. The Swiss school of graphic design was known for its range of visual exercises which provided rigorous training (Diethelm, 1982; Hiebert, 1998). Each of the exercises addresses a kind of visual problem, such as hierarchy, contrast or rhythm. Collectively, these exercises provide a pedagogical methodology that improves the quality of the designer that completes this training. Without this or another methodological structure, students randomly try visual solutions to random design briefs or emulate solutions they find interesting. While enough of this kind of experience will certainly train a competent graphic designer, their skills and knowledge will remain a craft – they’ll know what works but not necessarily why. Furthermore, they will have trouble solving different design problems with which they have little experience.

Methods improve communication about the purpose and value of design itself. Not at all a false assurance, the ability to articulate specific steps in a design project, expected results and resources required helps designers work with other professions unfamiliar with the design process. Most professions have a structure under which they work. Some professions such as market research require explicit explanation of the methodology used as a form of evaluation of quality and appropriateness. Improving communication can also lead to better collaboration among different design teams working on the same project. Sharing a model for how the work can proceed allows collaborators to more quickly contribute to the problem at hand.

Methods improve communication  
about the purpose and value of design itself

Methods deepen the designer's knowledge and understanding of their field. With a structure within which to work, a practitioner may more easily reflect on and compare experiences between cases. This reflection and review of work can result in new insights about one's practice. In academia, a growing body of methods allows specific studies to be conducted to deepen and extend existing methods and to invent completely new ones. A research community, sharing results of work with other academics as well as practitioners, builds the momentum necessary for continual advancement. Journals, conferences and academic programs grow and extend the design field. This community is growing rapidly in Asia where a Ph.D. in order to teach is now required in the leading universities with design programs. While an argument can be made that in the short term qualified candidates will be overlooked, it is difficult to argue that it is not beneficial

## | Summary |

that the Ph.D. become the terminal degree in design. Design activity does not have to remain a craft-based activity. It does not need to be portrayed as a mysterious search for insight or involved with inexplicable creative leaps as the literature and popular press so often describe. Design is a discipline that should enjoy a community of practitioners, academics and students that work on building its base of knowledge. Core to this base is the development and evolution of design methods. There may be significant cultural barriers within design that has kept it from growing its base of knowledge more rapidly. That methodology removes the creative aspect of design and an emphasis on doing design over understanding how it works are two of the more significant misunderstandings. The essay on Collaboration in this issue also underscores the need for explicit method when inter- and multi-disciplinary teams address problems and need to negotiate process. The argument for design methods just presented puts into context the prospect and need for method in design from both a disciplinary and practice oriented perspective.

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## | ACKNOWLEDGEMENTS |

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