Introduction

We suggest that design science as a domain has a significant contribution to make in the development of new types of tools for mental health and personal growth. Donald Schön left a large footprint in the field of architecture and design. As clinicians craft new kinds of therapeutic tools for mental health and wellness, there is no wiser counsel than Schön on the value of the design studio as an innovation engine. While Schön's writings about the collaboration process have been referenced by clinicians extensively, our distinctive contribution to the field is to direct focus to "architecting" carefully designed studio environments for clinicians in graduate training.

Our book title concatenates our subject—psychology's new design science—with Schön's master work *The Reflective Practitioner: How Professionals Think in Action (1983)* in homage to its enduring significance. Schön forever changed our understanding of professional practice, broadly construed, with his searing critique of its forms, functions, and limitations. Schön's work also serves as a bellwether of societal change. Are we making progress toward the ideal professional he imagined three decades ago? Like opening a time capsule, our re-reading of Schön's book sharpened our view of the present. Using his analysis of the *atelier* as a springboard, we invited contributing authors to use his ideas as a touchstone when writing their chapters. Our contributors represent the fields of design practice, art therapy, music therapy, noetic science, and social work. Above all, we champion the unique role of the design studio as a pedagogical and methodological brewery for future clinicians.

Schön looked across professional camps (architecture, psychotherapy, engineering, urban planners, law, medicine) to discern behaviors, pedagogical methods, and professional quirks that characterize how these domains operate and communicate with their clients, as well as shine a spotlight on their shortcomings—all through the lens of design. According to Schön, all experience is mediated through its design attributes: (a) through the *media and language* used to conduct experiments, (b) a *value system* that directs inquiry, evaluation and reflective conversation, (c) *theoretical orientation* used, and (d) the *frames* or *frameworks* within which professional activities are situated and conducted. Most relevant to this volume, Schön's sociological meta-analysis peered into the future and predicted three possible scenarios for how the professions would evolve:

- *Future 1*– Professionals would continue to function under a "technical rationality" which lays claim to expert knowledge that is mystified in the service of shoring up professional rank/status in a society of elite specialists, working within a system in which distribution of social benefits are unjustly allocated. The ethos of technical rationality and the values it perpetuates are tied to vast institutional resources; technical advancement and efficiency trump all other goals and values. Technical rationality manifests itself in academic and corporate settings and is defined by Schön as a philosophy of instrumental problem solving made rigorous by the application of basic science to applied science and its techniques. In this view, better technology is the solution to all problems.

- *Future 2* – Professional knowledge would be de-mystified by a new breed of citizen advocates, citizen-practitioners, citizen-planners, citizen-builders, citizen-physicians, who take possession of and dispense expert knowledge more equitably throughout society without licenses, or institutional mandates.

- *Future 3*– The emergence of *the reflective practitioner* in each domain of professional practice which Schön defined as being characterized by: (1) a less autocratic relationship between expert and client, for example, acknowledgment that the client brings knowledge to the professional relationship and is a partner, not a receptacle of information; (2) experts who understand they have an obligation to communicate their professional process to clients, rather than dispense opinions. In other words, conduct reflective conversations with clients, recognizing that meaning-making of the problem context is jointly constructed in the design of solutions. This in turn, would result in a more equitable distribution of knowledge.

Schön (who died in 1997) couldn't have anticipated the growth of the Internet and mobile media as mediating factors in how professional knowledge, professional education, and professional practice would change—nor could he have predicted that this technical capability would in essence collapse the three distinctions he proposed into another kind of future. Schön's analysis of the professional class still stands as a distinctive voice and enduring critique of the chasm between theory and practice, new knowledge and its application to real world solutions and problems. His work is germane to our topic because his definition of a reflective practitioner encapsulates what many new designers of convivial tools[1] and novel psychotherapeutic interventions are striving to offer.

In terms of our readers, we continue to write for an academic audience of researchers, instructors, graduate students in design and the clinical arts, along with general readers who are interested in exploring the design studio as a context for shaping therapeutic experiences across a variety of domains within psychology.

Currently the clinical literature is dominated by three modes of discussion; (1) theory which explores and defines the healing process, (2) techniques of psychotherapy which are authored by clinicians, and (3) case studies by both clinicians and patients reporting on their experiences of recovery. Our book series offers a *fourth conversation*, which includes design reasoning as an established means for applying theory and research to mental health and personal growth.

In the following pages, contributing authors explore the therapeutic encounter as a design challenge. Design can be an intimidating word or concept for the non-initiated who are not architects and engineers. We hope to dispel the belief that design practices are only the province of design schools. Our intended purpose is to invite psychology clinicians of all persuasions to play and experiment with new media. Clinicians are trained to be reflective practitioners. Using Schön's definition—they are taught to reflect-on-action and reflect-in-action to shape every

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[1] Convivial tools as Ivan Illich defined them pertained to objects, social arrangements, or institutions that emerge from creative interaction between people and evolve naturally—not the result of industrial production forced upon them. Written in 1973, Tools for Conviviality was Illich's blistering critique of modern corporate culture. Illich offered an alternative framework for conducting science, law, and material production processes.

therapeutic encounter. They are expert problem solvers and creators of healing environments. No two individuals are alike; therefore clinicians have great facility in modifying or adjusting a therapeutic setting to fit the needs of clients. When clinician/designers flourish and expand their expertise beyond current channels or access points (mental health institutions, clinics, and schools) we will have healthier societies. Tinkering with new media as an extension of their skills is well within reach.

Schön's perceptive contributions to design science include:

- The concise definition of design as a conversation with materials and a context.
- The realization that much of what professionals do in terms of the evolution of their knowledge and practice is unconscious and intuitive – that is, not captured in textbooks, nor is it effectively communicated to students in graduate training programs.
- Professionals are primarily artists, not exclusive practitioners of scientific methodology in the execution and application of their knowledge.

Organization of the Book

The book is divided into three sections. Below, a brief summary of the contents:

Part I.   Design Thinking Under the Influence of Donald A. Schön

If technology is to embody higher levels of creativity and employ principles of human development as a starting place for design, it will be facilitated by the full participation of people with deep knowledge of philosophy and psychology. At the moment, these disciplines are just beginning to consider that they might have an important role to play in shaping technical design. These 'outliers' could impart new values into an industrial design economy fixated on robotics and automated systems. As it pertains to mental health and personal growth, the adoption of technology to extend expertise and service delivery holds great potential. In Part I (chapters 1-3), the authors explore Donald Schön's theoretical impact, imprint, and persistent influence in a number of different settings to help us better understand: (a) Schön's enduring relevance to those seeking to embrace design as a meaningful component of professional development, (b) how to bring an open and questioning attitude toward our relationships with clients that embodies refection-in-action and reflection-on-action both in education and therapeutic settings, and (c) how to apply Schön's ideas—along with other methods—to the organization of healthcare settings and therapeutic interventions.

Chapter 1 - The Debut of the Design Studio in Clinical Training Programs
In Chapter 1, Susan Imholz discusses how the design studio can accelerate innovation in clinical settings and how new thinking can revitalize the field of mental health. Psychology practitioners

can learn from the design literature as they embark on their own path of experimentation with new media as an extension of expertise for both research and clinical practice. The debut of studio settings in clinical training programs is occurring slowly; the expectation that students be prepared to function in a healthcare system that is technologically sophisticated has out-paced programmatic change. Donald Schön's ideas about the role of the studio as an essential component of innovation and creativity can be a scaffold for novice designers from any field. Schön's admonitions about the limits of *technical rationality* as an approach to education and product development are also discussed. It's suggest that transfer of new knowledge (facilitated by design studios), through clinical practitioners-in-training interfacing with the institutions where they do practicum and internship placements, will create a new innovation vector that doesn't currently exist.

Chapter 2 - The Lab, The Studio, The Couch: "Conversational" Settings for Mutually Guided Design Inquiry

In Chapter 2, Edith Ackermann shares her firsthand experiences of life with Jean Piaget in Geneva, and with Donald Schön at MIT. Ackermann draws on her work as a researcher in developmental psychology with Piaget, and, her experience teaching in the Architecture Department at MIT.   She analyzes the potential relevance of the design studio for other forms of mediated transactions, from the lab to the studio, from educational settings to therapeutic interventions. She presents the clinical method of investigation or "conversational" technique long used by social scientists, educators, and health professionals as a window into other people's minds. The chapter also addresses the relevance of mediated reflective practices in the context of the architectural design studio based on Donald Schön's notion of guided inquiry as a design transaction, and Gordon Pask's conversational theory of mutual attunement. Guided inquiry in the design studio traditionally involves two or more players (tutors, tutees) entangled in a web of master-apprentice relations that by definition are asymmetric. What remains at the heart of the design studio experience for Ackermann is play; "the playing around is just as important as the talking about".

Chapter 3 - Social Research and Development: Possibilities for Reflective Practice in Social Work and the Helping Professions

In Chapter 3, David Moxley remembers Donald Schön for his prescient observations about the speed of technical change and its consequences. He also notes that Schön recognized innovation processes as a form of social learning early on. Schön championed the importance of metaphor and narrative as a valid interpretive device and an essential element of organizational learning. According to Schön, Moxley observes, the constancy of learning is the only stable system within an organization if it is responding to the demands produced by an ever-changing environment. As both an instructor and a consultant/practitioner with many years of experience in both realms Moxley has developed great facility in applying the theoretical literature on managing design innovation to the delivery of human services. Borrowing from the design literature, Moxley's description of *adaptive innovators*, *transformational innovators*, versus *transcendent innovators* provides a useful guide to students, social work professionals, and consultants for assessing the growth potential of the service organizations they work with.

Part II. Convivial Tools: Creative Inspiration for Making Healing Environments

In Part II (chapters 4-8) we feature five collaborators who are thinking deeply about the creation of new types of learning/healing environments, and who are stretching the boundaries of traditional clinical practice tools. All share their problem setting and problem solving activities with the notion of helping others on this same journey. They provide specific direction on how to organize and manage exploratory design projects through their examples and help us to understand: (a) the processes and pitfalls of therapeutic app development in the open marketplace, (b) the importance of using theory to structure and organize a developing area of inquiry, as well as providing insight into how mobile data-sensing tools are opening up new avenues of research, (c) how model of mind is the driver of experimentation and research in tool development, and (d) how the sensibilities and techniques of the therapist are deployed to analyze and develop new media for therapeutic use.

Chapter 4 - Designing an Art Therapy App

In Chapter 4, art therapist Nancy Choe shares her journey of developing an iOS-based art app for art therapy use. Nancy's discussion and exploration of new media for psychotherapy was inspired by the abundance of medical and psychological treatment-oriented tools she was seeing in the marketplace—but not for art therapists. Choe chronicles her research into user-experience design (UXD), human-centered design (HCD), and her search for a product development partner. She then models her app development thought process for the reader. This is both an educational tale for prospective designers, and a journey of empowerment. Nancy Choe affirms that innovating is a relationship-based, knowledge-building process.

Chapter 5 - Designing Transcendence Technology

In Chapter 5, Julia Mossbridge defines transcendence technology as a new field that has roots in ancient mysticism and describes how it is evolving using emerging mobile bio-sensing technology. Julia researched several communities experimenting and designing self-empowerment tools. She then provides a six-stage conceptual model of transcendence consciousness for future designers who want to address gaps in this toolset. Julia also presents preliminary case study findings from data gathered using her phone app ChoiceCompass, and discusses some very interesting gender differences in the use of the app. ChoiceCompass uses a measure of heart-rate-variability (HRV) as a body compass for making important life decisions.

Chapter 6 - The Nature of Healing Sound and Its Design

In Chapter 6 John Beaulieu, a musician, tool designer, and sound/music therapist gives us insights into the healing nature of sound. He's explored the use of sound as a therapeutic medium, and documents recent research that suggests frequencies for healing disease are being scientifically defined and validated in the field of quantum neurology. Despite its use across the ages, beginning with the asclepieia of Greece, sound and music therapy are viewed more commonly as constructive pastimes rather than providing physical benefits to the human body. As science

begins to define and validate what has been considered ephemeral phenomenon, we may be on the verge of a whole new understanding of how sound and electrical frequencies interact with organic material and human biology.

Chapter 7 - Illustrating Stories: Using Graphic Novels in Art Therapy Research and Practice

In Chapter 7, art therapist Natalie Carlton gives us a historical review of the use of graphic novels as an expressive medium, shares a personal journey of art making using graphic novel software (Comic Life), and gives a professional assessment of its use in her clinical practice. This is a medium that has great appeal for children and adolescents in particular. For these age groups, the comic format as an expressive medium is perfectly matched to the developmental phase where play with words is taking on new meaning—personal meaning. The freedom to author and create narratives instead of being consumers of reading material in school is very liberating. It's one of the first great lessons of becoming a reader/writer to learn our own voice and experience are worthy of documentation. Our own narratives can be shaped into a visual story narrative that is just as compelling (visually and verbally) as the books we read in the library!

Chapter 8 - Open-Source Design: OpenBCI

In Chapter 8, Susan Imholz explores open-source tools as a manifestation of reflective practice (as defined by Schön) and a lifeline for clinicians who are beginning to explore new media as an extension of their skills. An interview with OpenBCI founder Joel Murphy articulates the challenges involved in being an open-source company in the health and education marketplace. Imholz acknowledges that creative exploration—or the type of creative exploration we discuss in this book—often comes with a hefty price tag. One way around expensive builds is to join a maker community that values open-code sharing and offers assistance, or barter as a means of bringing new ideas into existence. DYI and maker communities are an important resource for fledgling designers across all fields. The chapter also cites new research on brain science, made possible by new mobile bio-sensing tech.

Part III. Summary & Synthesis

We have taken the reader on a journey, and this third phase of the book summarizes the main points with the goal of synthesizing disparate ideas into a more cohesive whole. The thread that binds each chapter together originates with Schön's ideas about what it means to be a reflective practitioner. Schön had very specific thoughts about what it means to live *artfully* as a professional. Chapter 9 furnishes us with greater insight into the background and experience of our authors, their professional pursuits, their understanding of the cultural environment they work in, and greater detail about their clinical knowledge and practices. In Chapter 10 we revisit the idea of the reflective practitioner in action, as defined by Schön. We elaborate on this idea using examples provided by contributing authors. Additionally, we summarize what designers can learn from clinicians, and conversely, what clinicians can learn from design science. In closing, we sketch out future directions for research and study.

Chapter 9 - CrossTalk: What Can Designers Learn from Clinicians?

In Chapter 9 the editors (Susan Imholz and Judy Sachter) interviewed the contributing authors (Julia Mossbridge, David Moxley, John Beaulieu, Nancy Choe, and Natalie Carlton) about the question of what designers can learn from clinicians. This free-form exchange flushes out ideas, values, motives for research, and reports on current preoccupations of the authors on this topic. This format expands upon each contributor's work and their past experience in ways that enhance and complement their chapters.

Chapter 10 – Summary & Synthesis of Psychology's New Design Science and the Reflective Practitioner

In Chapter 10, Susan Imholz and Judy Sachter summarize the main points, and place the subject of psychology's new design science in larger cultural context to highlight its significance. The idea of the reflective practitioner in action, as defined by Schön, is revisited. Using examples provided by contributing authors, each is characterized as representing the reflective ideal. The chapter also returns to the subject of what designers can learn from clinicians, and conversely, what clinicians can learn from design science. The authors emphasize that the book's distinctive contribution to the field of psychology at the moment is to direct focus to "architecting" carefully designed studio environments for many kinds of clinicians in graduate training. This, in their opinion, is the most effective way of investigating uses of new media for therapeutic benefit while remaining true to closely held values. In conclusion, future directions for research and study are sketched out.

Part I. Design Thinking Under the Influence of Donald A. Schön

CHAPTER 1

The Debut of the Design Studio in Clinical Training Programs

Susan Imholz

1.0 Introduction

What role does design thinking and design reasoning play in the evolution of any profession? The history of design might be defined as: (a) an unending exploration of materials, (b) increasing sensitization of architectural and manufacturing impacts on, and relationship to the built environment, and (c) an increasing expansion and inclusion of other disciplines as a source of knowledge or inspiration for the creation of objects. So, why shouldn't the domain of psychology borrow and learn from architecture's master pedagogues as it re-launches its own design science? I use the term re-launch because mental health professionals were once actively engaged in the "architecting" of healing environments in the 19th century. This exploratory phase declined significantly mid-20th century with the beginning of a government funding crisis for mental health and loss of confidence in the quality of care provided by large public psychiatric hospitals and asylums (Imholz & Sachter 2014).   In its place, small niche treatment and recovery centers with very specific therapeutic approaches targeted toward one type of condition/illness have sprouted in the US. Today, the challenge is how to extend clinical expertise in communities using social networks or mobile digital architecture which enables psychological expertise to go where it hasn't gone before. Mobile technologies allow for new modes of clinical research and data gathering as traditional laboratory equipment is set free from institutional settings to become apps on phones. These tools also provide clients/users with new learning experiences. Introducing design thinking and design reasoning in clinical training programs could provide students with a strong footing for experimentation in this era.

This opening chapter revisits the work of architecture pedagogue Donald Schön for his insights on how innovation thrives, for his expansive understanding of how design shapes social life, and his call to action to all professionals to be mindful of their societal impact. We are not the first to revive and write about Schön's relevance to therapeutic practice, but we hope we do so in ways that clarify and amplify his views on the design studio as innovation engine, and the role it can play to transform mental health. Many clinicians took notice of his work when it was first published and have referenced him when discussing "mindfulness" training for clinicians (Stew 2011, Kabat-Zinn 2003, Epstein 1999), and when discussing "collaborative" therapy techniques (Beaudoin & Duvall 2017, Paré & Larner 2014, Redmond 2006, Anderson 1997). The following discussion is no substitute for a full reading of Schön's book (which I recommend to psychology

clinicians). I highlight three topics Schön wrote about at length that hold particular significance to psychology's new design science:

1. The design studio as an essential component of innovation and creativity;
2. The limits of 'technical rationality' as an approach to education, production, design, and as the antithesis of creativity;
3. The hazards of ignoring history and the humanities as a source of knowledge for designing.

New technical intermediary objects (apps, games, self-quantifying devices) for psychological and personal growth are blossoming. The emergence of these tools is contextualized as a cultural shift from talking about emotional issues as the main medium of exchange, to *experiences* that support growth and change as an important addition to traditional clinical practice. In the following pages I explore how the clinical design studio is an enhancement to academic study in psychology, along with how it might contribute to the field of engineering. Further on, the chapter returns to Schön's ideas about what it means to be a reflective practitioner, and concludes with a discussion of his enduring influence.

1.1 The Design Studio as Intermediary Innovation Space

Schön observed that the design studio is an *intermediate zone* that doesn't lend itself to theory and techniques derived from normative professional practices (Schön1985) [1]. Clinical professions have the practicum, but this usually involves student internships in established organizations. The design studio, asks what if? It involves learning to frame a problem then solve it based upon considered reflection on possible courses of action.[2] In short, the studio places students outside the conventional context of practice in their field and allows them to imagine what doesn't currently exist. This is how innovation starts—the design studio supports the continuous integration of new spheres of knowledge—psychology, ecology, technology, biosynthesis.[3] Knowledge systems have a tendency to become fixed or dogmatic over time, preventing new influences from taking hold. The fluidity of the studio as practice environment loosens this "fixation effect" (Jansson & Smith 1991, Tseng Moss Cagan & Kotovsky 2008, LeMasson Weil Hatchuel 2010, LeMasson Hatchuel Weil 2011). This practice design space allows for experimentation without risking the consequences of failure, or the scrutiny of premature evaluation that might preclude trial balloons.

Although still a novel idea, the importance of the design studio as a component of clinical training programs is gaining traction. A prime example is Sofia University's new Transformative Technology Laboratory founded by Jeff Martin, Mikey Siegel, and others. This media lab supports students in exploring the notion of being designers of therapeutic environments, services, and devices. It is one of the first hands-on design labs that resides within, or along-side

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[1] Schön, D. (1985). The studio: an exploration of its traditions and potentials, p.5.

[2] Unlike Herbert Simon, Schön insisted that humans never explore *all possibilities*—he didn't believe that people, as a general rule, think in combinatorial ways. -- Edith Ackermann

[3] Schön, D. (1985). The studio: an exploration of its traditions and potentials, p. 86.

clinical psychology graduate programs. In 2014, Sofia absorbed the former Institute of Transpersonal Psychology (ITP) in Palo Alto which had been an outpost of holistic thought and clinical practice since 1975. According to its website (www.sofia.edu/about/history), ITP was founded …

> *"to create a school of psychology that would fully prepare psychologists to understand human nature from an approach that transcends the pathological and encompasses the whole human being in the context of culture, physical health, mental health, and spiritual health."*

Perhaps it's perfectly logical that the Sofia University design lab emerged in what was considered one of the most philosophically expansive psychological clinical training institutes. This merger had many critics who believed it badly compromised ITP's original purpose.   However, the lab is an exciting development because there are so few academic environments where technical tinkering is counterbalanced with deep philosophical and psychology scholarship in equal partnership. Whether the theoretical and philosophical aims of ITP can be imbued in technology is another issue—this is key to distinguishing the Transformative Technology Lab from a host of other applied psychology programs.

In his writing on the studio as a pedagogical catalyst, Schön (1985) noted that the professions have a responsibility to do more than entrain students to think like their brotherhood. Referring to medical schools, law schools, psychotherapists, and architects, Schön proffered that design spaces are learning labs that force people to pay attention to the strangeness of unique cases that escape the categorization of established theories. The studio allows for and engages value-laden questions as well as technical and practical ones. Altogether, it emphasizes process and dialogue over product results or outcomes—stretching our understanding of reality.

Granted, there are many laboratories within psychology programs. Why site Sofia University's Transformative Technology Lab specifically? The significance of this example is that it is taking root in an environment steeped in holistic thinking and clinical knowledge. Clinical training programs are the places where deep knowledge resides about the mental health system, and they are also the places that have continuously interfaced with the mental health system over time. Traditionally, few clinical training programs address the design of therapeutic environments—this is relegated to architecture. The combination of both is essential to spur innovation.

Other outliers of innovative design activity across psychology disciplines include the Institute for Noetic Sciences and the Institute for Heart Math[4]. The emWave heart monitor (from the Institute of HeartMath) and ChoiceCompass [5] (by Julia Mossbridge) are examples of new personal growth/mental health promoting devices resulting from a marriage between psychological/biological research and design thinking—with the goal of creating new types of personal learning tools that have never before existed. In terms of psychiatry, Stanford Medical

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[4] The Institute of HeartMath is located in Boulder Creek, CA. Rollin McCraty, Director of Research at contributed a chapter to our first book on what he and his colleagues have learned about bio-physiology and emotions.

[5] Contributing author Julia Mossbridge is the designer of this tool; she discusses her research in Chapter 5.

School has also made recent investments in creating lab environments where innovation can flourish employing design thinking (see https://med.stanford.edu/psychiatry/research.html for more information).

Encouraging *all* psychology practitioners to think more deeply about how they can extend their expertise using technology *on their own terms* is a tall order. Scions of architecture emphasize that you must begin with theory as a strong foundation for design. The human computer-interface (HCI) design community has been chipping away at this challenge (Cooper, Reiman, Cronin & Noessel 2014, Norman 2013, Rogers, Sharp & Preece 2011, Moggridge 2007, Dym et al 2009, Cockton 2016). There is no circumventing the fact that most psychology clinical training programs don't yet see the benefits of employing technology and design as a means of expanding their reach or advancing the domain. Could it be that clinical training programs have something of importance to contribute to human-computer interface construction?   A "ballast" that anchors principles of human development in the design process?

Psychology's New Design Science: Theory & Research (Imholz & Sachter 2014) offered broad design principles for making new clinical tools emphasizing creativity and client collaboration to catalyze object conceptualization in studio settings:

- Construct objects and tools that increase learning, participation, and creativity on the part of the client/patient;
- Construct objects and tools that deliver clinical expertise to a wider community of clients/patients who are living in the social world;
- Embed analytical tools in avocations and activities that are enjoyable;
- Design based individualizing treatments or interventions and new research

Defining psychology's design science in this way puts the field on a trajectory of unlimited possibilities for growth and a continuous path of divergent exploration, rather than simply re-purposing traditional tests and measures in digital formats. In the chapters that follow, pioneering clinical designers and practitioners share their research and design processes to demonstrate where they have found inspiration and how they are imagining the future. These are personal stories that offer encouragement and direction to others on this path.

In addition to the Sofia University clinical studio environment, it has to be acknowledged that the studio experience has been an essential part of the graduate school training in the expressive therapies (art, music, dance, psychodrama) and creative arts therapies for many years. In these clinical graduate programs the focus on creative thinking as a foundation of the therapeutic relationship, and exploration of many kinds of media (including video and digital media) has been ongoing, but without featuring the design literature as core cannon or context. As contributing author Edith Ackermann noted, the focus in clinical programs has been on conversational theory, and discourse analysis. We deliberately sought out creative arts therapists as collaborators who are focused on new media for this volume; two contributing authors are art therapists, another, a music therapist. We also feature a contribution from a scholar-practitioner in social work. Social workers are the first line of defense in the field of mental health in the US. They outnumber psychologists, psychiatrists, and psychiatric nurses combined according to the US Bureau of Labor and Statistics.

What has been beyond the scope of almost all clinical psychology programs of all kinds is the

idea that training and practice includes the design of therapeutic environments. If it occurs at all, this discussion is usually limited to the formation of a private practice. The notion that practitioners can question the structures, organization, and delivery of services within the institutions where they work and contribute to environmental metamorphosis is still inviolable. Introducing the design studio, design thinking, and design reasoning into the graduate curriculum changes this explicitly, expanding the limits of professional expertise.

1.2 The Limits of Technical Rationality as an Approach to Design for Therapeutic Ends

Schön's (1983) description of technical rationality was effusive and expansive. Here, his work is summarized and the discussion is tapered to main points relative to our book. I then attempt to illustrate the deleterious effects of technical rationality as it persists today—particularly as it relates to the quarantine of psychological knowledge.

In broad strokes, Schön began *The Reflective Practitioner* by identifying a 'crisis of confidence' beset by professionals in the mid-20th century which, by his pen, included architects, engineers, lawyers, social workers, psychotherapists, and urban planners. He observed that the circumstances in which all of these highly skilled members of society function is inherently unstable due to accelerating technological change. This reality, even more relevant today, places new burdens on the professions to adapt to technical advancements. The roots of this growing skepticism, according to Schön, was fueled by cynicism about the value of professionals' contributions to society, ethical questions about their ability to monitor their cohorts, and the ability to act in the public interest rather than self-interest (p.13-15).

More narrowly defined, Schön described technical rationality as a philosophy of instrumental problem solving made rigorous by the application of scientific positivism[6] and its techniques (p.21, 1983). It is the dominance and totality of technical rationality that is notable for Schön—it affects and exerts its power on:

- ➢ scholarly writing
- ➢ a preoccupation with increasing specialization
- ➢ the implicit nature of institutionalized relationships
- ➢ research practice
- ➢ professional curriculum across the professions

In short, he characterized it as a paradigm that may have outlived its usefulness as an approach to innovation. Post mid-20th century, Schön detected a new awareness of the limits of technical rationality among his colleagues at MIT where he taught for many years, and this discontent centered on difficult and messy case problems which required unique solutions in architecture, engineering, and medicine:

> *"Technical rationality does not work as a strategy when there is no agreement on 'ends' or the outcome of an intervention…when there are conflicting paradigms of professional practice, as are found in the pluralism of psychiatry, social work,*

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[6] Comte, A. (1974). The Positive Philosophy. New York, NY: AMS Press.

or town planning" (p.41,1983)… [and] where there is contention over multiple ways of framing the practice role, each of which entrains a distinctive approach to problem setting and solving…[When] practitioners do resolve conflicting role frames, it is through a kind of inquiry which falls outside the model of technical rationality" (p.41-42, 1983).

Today, Schön's version of technical rationality and instrumental reasoning is still firmly entrenched in academia and corporate contexts; it may be even more exacerbated—and less questioned. As a philosophy and approach to production and consumer services, it has an agenda and value system all its own. Much of psychological knowledge has been side-lined in deference to the prime directive of the application of basic science to applied science[7]. The knowledge-bottleneck is bidirectional, since engineers and industrial designers reduce psychological expertise to a consulting function, *not* the theoretical foundations or knowledge for prototyping. I categorize this schism as one between creative design informed by psychological principles, and the dominance of machine learning as a subject or object.

Both commercial and academic settings are preoccupied with imbuing robots with human characteristics—a one way transfer of knowledge, or machine mimicry. This form of artificial intelligence and engineering is of limited use to artists, educators, clinicians, and many software designers who are interested in amplifying human creativity or creating new types of learning environments that have never before existed. For these creative practitioners, product design must start from deep immersion in theory of human development and theories of mind.

I pondered this form of design bias as an epistemological divide while still a graduate student at MIT. My adviser, Seymour Papert, challenged me to find out how engineers differed from artists using a clinical perspective to better understand what epistemological difference is. I set about the task by interviewing graduate students at MIT from two different departments; the arts (film/video) and engineering (architecture machine group). Here's what I learned: the two groups had very different life goals, verbalized different sources of motivation and satisfaction for academic studies and career choices, they also perceived their role in the world differently. The artists were interested in using their technical skills as a means to an end, i.e., the creation of a narrative that expressed their unique perspective on things. Additionally, they stated distinctly internal and self reflective sources of motivation for their choice of a career. The engineering students wanted to be technical architects because they liked the idea of solving "hard" problems—problems that had clear and objective criteria applied to the evaluation of their efforts—success could be measured, and success or failure was an obvious outcome of their design approach. The engineering students' source of motivation for career choice was decidedly external, including recognition and rewards by their community of practice, and the satisfaction of knowing that their software/device/engineering project contributed to progress in their chosen field.

To summarize, the two groups had distinctive problem-solving approaches, tactics, and strategies that fit their goals and personalities. Engineers, as a generalization, don't care to research an issue ad nauseam, the sooner they can narrow the scope of a problem and begin work on solutions, the happier they are. They are convergent thinkers. The main job of the engineer is

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[7] Schön, D. (1983). The Reflective Practitioner: How Professionals Think in Action. New York, NY: Basic Books, p.24

to make something that works. The iterative nature of the engineering enterprise has as a goal to improve performance specifications. Artists, on the other hand, have a distinctly internal locus of control; they design and create from what they personally judge to be important subject matter, they are divergent thinkers who explore novelty, difference, and the culturally topical. The iterative nature of film-making is less about improving upon the last film, and more about expanding one's range of subjects for study and expression. By comparison, artists, clinicians, psychologists, and educators have a high tolerance for ambiguity, which allows them to hold several competing theories in mind, testing each one for efficacy in regard to its value for clients/students as practitioners. Converging upon one approach is not essential to their methods or practice. They are primarily divergent thinkers whose main goal is to create an emotional holding environment conducive to psychological growth that is highly individualized. The iterative nature of psychotherapy is the "substrate" of human growth and development; it is not pegged to expected outcomes. Clinicians' thought processes, therefore, have attributes of both artists and engineers as previously defined.

Experimental psychologists and neurologists are now mapping the allocation of brain resources across brain regions during creative versus non-creative tasks with fMRI and EEG technology. Imagery from these studies show that for novel creative tasks (vs. rote recall) the brain is accessing and activating different lobes (see Chapter 8) confirming that people engaged in creative pursuits are using their brains differently.

In his final analysis of *The Reflective Practitioner*, Schön (1983) wrote: *what's missing in most professional training is an emphasis on reflection–in-action*. This, he proposed, can be remedied by elevating the role of the design studio in graduate programs. At the time, he was taking aim at architecture and engineering schools in particular, but the same admonitions or advice applies to all professional training programs. To recap, the studio is the intermediary zone in which creativity can be applied, intuitive insights can be shared, exceptional cases can be examined, and value-laden questions can be raised to enhance problem solving. These activities also result in expanded consciousness of what's possible. The design lexicon now includes; human-centered design, cognitive design, values-sensitive design, and sustainable design in nascent forms. In academic settings, design theory, technical engineering methods, psychiatry, developmental and clinical psychology *are* intertwining at a snail's pace. Accelerating this integration will likely result in a blaze of creativity, and this has the potential for improving the field of mental health. If we are feeling the pinch of efficiency and instrumental reasoning as it has been applied to our daily lives and the devices and technical interfaces we interact with, there is a reason: most are devoid of psychological knowledge by design. The good news is we have the ability to change it. In Schön's concluding remarks on technical rationality in *The Reflective Practitioner,* he called for a new epistemology:

> "*Let us then consider the question of professional knowledge; let us stand the question on its head. If the model of Technical Rationality is incomplete in that it fails to account for practical competence in "divergent" situations, so much the worse for the model. Let us search instead for an epistemology of practice implicit in the artistic, intuitive processes which some practitioners bring to situations of uncertainty, instability, and value conflict" (p.49, 1983).*

Many in the engineering sciences have already relegated the history of philosophy and

psychology to the dust bin, thinking it has no enduring relevance. Nevertheless, a rising generation of psychology practitioners and entrepreneurs are affirming the clinician's identity as capable maker of new tools inspired by psychological theories, bio-physiology, and ancient wisdom. By disregarding the depth of our historical record we lose the thread of ideas that contribute to complexity of thought, and by extension the complexity of design.

1.3 The Hazards of Ignoring the Humanities as Inspiration for Design

Schön tells us all experience is mediated through five design attributes;
- through the *media and language* used to conduct experiments,
- a *value system* that directs inquiry,
- *evaluation* and reflective conversation,
- a *theoretical orientation,* and
- the *frames* or *frameworks* within which professional activities are situated and conducted.

We have an abundance of variables for assembling design methodology. There are many media and linguistic vocabularies to choose from, numerous values systems and theories to choose from, and multiple perspectives with which to frame a problem. The richest source of our literary and historical lineage in sheer volume of written words is found in the humanities. Contrast this variety of thought with technical rationality as a starting place for product design, and its narrowness and dominance becomes glaringly evident.

If design reasoning appears as a hallmark of an evolving discipline, perhaps clinicians are overdue in embracing the design literature. In their analysis of the history of design science from the mid-1800's to the present, Le Masson, Hatchuel, & Weil (2011) surmised that creativity appears to be a key driver of design advances in methods and theory. Contrary to the belief that design is primarily driven by mechanization or technical rationality which Schön suggested, Le Masson and colleagues place the experts' professional development at the center of the product development activity and identify creativity as the driver of progress (Shai, Reich, Hatchuel & Subrahmanian 2013, Le Masson, Hatchuel, Weil 2013 & 2015). Le Masson's perspective also confirms that the need for making more sophisticated tools, knowledge capture processes, and organizational structures emerges as a feature of a maturing discipline. Putting creativity at the heart of evolving design practices is not a common view; it is the most far-reaching and optimistic framing of design science and its contribution to all other disciplines.

The Technium as market engine has chiefly been in service to two masters—consumerism, and profiteering. Here and now, we are concerned with the lack of harmonious sensibilities in the builders of interactive technical architectures and its impact on how we define therapeutic encounters. Critical to a focus on psychological and mental health, is the fact that therapeutic environments have worsened over the last half century. In a conversation with Dr. Otto Kernberg[8] in 2016 about the future of clinical practice, he quickly noted that therapeutic

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[8] Currently DeWitt Senior Scholar and Professor of Psychiatry at Weill Cornell Medical College in New York City, and former Clinical Director of the Menninger Hospitals in Topeka, KS.

Table 1. Overview of a Clinical Psychology Design Course for Art Therapists

Subject Area	Goals and Objectives	Activities & Outcomes
Historical Perspectives and Frameworks	Students will develop an understanding of the historical context of design thinking and reasoning as it applies to therapeutic settings and mental health.	The asclepieia of Greece—places where people suffering from physical and mental exhaustion recuperated—begins our study of design thinking. We examine how our changing model of mind drives and determines where, when, and how people who suffer from mental illness are treated. We will also focus on recent opportunities to extend and expand the availability of clinical expertise through the use of digital media. Students will survey researchers working in this arena. Clinical design processes will be reviewed. The objective of this unit is for students to better understand the current opportunities available to them as designers of therapeutic environments.
Analytical Skills	Students will develop analysis skills through reviewing software apps, and through exercises that contrast and compare traditional art materials with new media tools.	To apply clinical expertise to digital media as a designer, students first need to be aware of the inherent properties of new media and how they differ from pen, paint, clay and other expressive media. Through exposure to comparative media studies from the learning sciences, and from the growing body of literature in expressive therapy on this topic, students will develop new perspectives and analysis skills to apply to digital media. Participants will explore how model of mind is foundational knowledge for designing, and how changing concepts of mind are driving innovation.
Design Sensibilities	Students will explore and critique new media platforms and therapeutic tools using their analytical skill.	The array of self-quantifying tools and expressive digital media available is growing rapidly. How can clinicians incorporate these tools into therapeutic practice? What do they offer clinicians in terms of complementing therapeutic goals and objectives? How might they empower clients? How might they detract from the goals and objectives of psychotherapy? A sample of programs and applications surveyed include; Big White Wall (UK), EmWave Heart Monitor (Institute of HeartMath), ChoiceCompass (Mossbridge Institute), Comic Life graphic novel software.
Design Skills	Through rapid prototyping design exercises, students will further develop their design sensibilities by applying their clinical knowledge and expertise to new media platforms or tools.	We will explore the "maker- movement" as a model for design thinking and design doing. Many clinicians devise original activities and techniques specific to their practice. Students will use rapid prototyping exercises to develop an idea that demonstrates their clinical expertise and apply it to the design of a tool, phone app, or other media enhanced activity that expresses their unique skill as a budding designer. Through these activities, students will become knowledgeable and familiar with the process of product design.

environments, hospitals, clinics and places where the mentally ill are treated—have deteriorated over the last 25 years[9] . One of the last conceptual innovations in architectural design of mental health care facilities was invoked by the Menninger Hospitals in Topeka Kansas. There, the notion of bringing the community into the hospital—also known as milieu therapy—was attempted with a goal of replicating or normalizing life in a hospital setting. Today, the reverse paradigm is now the leading edge of innovation—bringing or seeding psychological expertise in communities via mobile networks beyond and outside of traditional hospitals and clinics. This undertaking might also result in; living more artfully, encourage the growth of an inner life based upon the development of creativity, expanding consciousness, and healthier relationships as our contributing authors demonstrate. Mobile expertise which functions as "just in time" assistance, or support to those in distress, may also alleviate the stigmatization of seeking mental health services.

While there are reasons to be optimistic about innovative approaches to mental health, healthcare at the government and corporate level is currently consolidating power and influence rather than encouraging broad avenues of innovation and experimentation outside traditional medical delivery systems. At the same time, the US government is predicting a significant increase in the use of technology as a care delivery pipeline as an improvement to service delivery.[10] What this means for mental health treatment remains to be seen, with a host of legal (HIPPA) prohibitions in place concerning the use of digital media.

Returning to Schön, if all experience is mediated through five design attributes (*media and language*, a *value system* that directs inquiry, an *evaluation system*, a *theoretical orientation,* and the *frames* or *frameworks* in which professional activities are situated) then clinical academic programs need to expand their definition of professional education to include all of these aspects. In Table 1, we offer a brief description of an introductory design course for art therapists which embody the principal ideas of our book. The course introduces students to the historical context of where, when, and how people who suffer from mental illness are treated, and how changing concepts of treatment and treatment environments are driven by prevalent models of mind. The course attempts to develop students' analytic abilities in evaluating digital media, introduces students to new media tools, and cultivates design skill through rapid-prototyping exercises.

Schön's recommendations to the professional community as to how to become a reflective practitioner can also serve as a guideline to clinical media designers:

- view clients as collaborators in professional consultation as a reflective conversation;
- de-mystify professional knowledge as being the purview of experts, and unknowable by clients;
- incorporate the client's knowledge and learning experience in the professional relationship, and acknowledge its value in shaping solutions;

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[9] Large costly mental institutions were closed in the 1970's and 80's with the promise of replacing them with group homes and community mental health centers; however, these environments never materialized.

[10] See The Internet of Things for Health Care: A Comprehensive Survey. Accessed from Internet 10/12/17 from ieexplore.ieee.org/document/7113786.

- value creative outcomes and new solutions that emerge in relationship with clients, acknowledging that neither party reigns over the other.

Schön's directives were originally intended for urban planners and engineers and product development processes. But, imagine these guidelines in use by health professionals who provide you with care—how different would your healthcare experience be? How would the look and feel of technical interfaces change if they reflected these values? We have a long way to go to realize Schön's directives in the field of health.

1.4 Conclusion

Design theorists are primarily responsible for opening up a dialogue about the nuances of control process issues in the production of things that make up our environment, and fixation effects which inhibit the exchange of cross disciplinary expertise. It is the design community that consistently critiques the way in which our technologies compromise or enhance our quality of life, not (for the most part) psychologists, engineers, or educators. It is the design community which is now championing the idea and growth of human-centered-design as a necessary counterbalance to technical rationality, and the commercially driven corporate engineering/production methodology and its views and practices.

Schön's analysis of the professional class still stands as a distinctive voice and enduring critique of the chasm between theory and practice, new knowledge and its application to real-world problems and solutions. Innovation in the use of digital media by clinicians is flourishing in these four settings:

1) primary and secondary schools
2) current healthcare institutions
3) the artistic studio
4) and psychotherapy

Psychology clinicians of one kind or another are employed in three out of four of these settings. This represents a huge challenge for graduate training programs to incorporate design thinking as subject matter. Nature abhors a vacuum—as do bureaucrats. The professional psychology community needs to be *leading* discussions about uses of technology pertaining to human development, personal growth, and mental health with politicians, policemen, and bureaucrats making policies—*not following blindly*. But this is precisely what will happen if the lack of interest in design and the use of technology as an extension of clinical knowledge persists. Schön was mindful of a faceless technocracy that seeks to grow and advance itself by injecting control systems where it finds little opposition.

The Enduring Relevance of Donald Schön

The design literature provides an important bridge to experts in any field who are beginning their journey of design thinking and making. In a final assessment of Schön's relevance for clinicians, it is his plea to professional practitioners to reclaim their status as designers of future work contexts and to innovate with compassionate ideals which seem most relevant to our book.

The Reflective Practitioner is still "a standout" because Schön's perception of his role reached so far beyond the boundaries of architecture as to be meaningful to *all* teachers, builders, and artisans. His touchstone was the teleological driver of design. He gave us permission to question the unquestionable. His observations also reflected a level of honesty about the political and economic system we live in rarely put into words by scholar/practitioners in the professional class. As Ford Professor of Urban Studies and Education at MIT, Schön lived at the epicenter of technical rationality as an approach to life. He was clearly uncomfortable with certain aspects of it, yet he felt that it could be fixed with the addition of a rigorous program of reflective-action *in situ*. Schön has had an enormous impact on western architecture and engineering schools, no doubt—but perhaps not the type of transformation he might have wished for.

My opinions and observations part with Schön on his assessment of how to 'humanize' technical rationality as a dominant philosophy. My informal studies on epistemological difference and my clinical experience have led me to believe that some of the reflective practices Schön described are more character traits rather than processes or sensibilities that can be taught. Therefore, it is only by collaboration across domains between people with diverse sensibilities and talents that we can expect to see reflective practitioners emerge in significant numbers. Forging more humanistic design sensibilities requires a commitment to principles of human development as foundational knowledge for designing in any domain; it's really that simple. This is a very difficult set of principles to embed across industry sectors in a commercially driven economy where corporate profits reign over benefit to individuals and communities ahead of all other considerations.

As is well known, technical innovation is the great disruptor. New models of practice that emerge from clinical and counseling psychology designers have the power to inform and transform our definition of healing environments and what constitutes human centered design—this in turn will impact other sectors of the Technium.

Schön was perceptive in forecasting the shift from objectivism (or scientific positivism) as the underlying paradigm of scientific research to one where personal frames and consciousness are recognized as influencing research and research outcomes. He is certainly responsible for accelerating this change in the engineering sciences along with other colleagues (Lipton & Bhaerman 2009, Deutsch 1997, Davisson & Germer 1928). Schön (1987) called this new 'frame' *constructivism*. In his constructivist view, "perceptions and beliefs are rooted in worlds of our own making that we accept as reality (p. 222)". This new foundation underlies the creation of narratives for experimentation and design. This definition builds upon John Dewey's notion of constructivist learning as applied to children—where the child's active engagement in learning as a co-creator of the learning environment is married to evolution of consciousness and cognitive growth (Hickman, Neubert, Reich 2009).

Psychology clinicians have long recognized the role of subjective influence in research. In their training, graduate students are taught to be mindful of their own frame of reference as an inherent bias and factor in the design of treatment interventions. They are also encouraged to verbalize their biases in clinical supervision. Objectivism vs. constructivism as an underlying approach to professional practice still separates clinicians from engineers and software designers today—it's what makes for, in Schön's words, 'mutual misunderstanding'. The engineer twinges at the clinician's subjective discussion of her work; and the clinician bristles at the engineer's lack of awareness of how 'facts' are perceived differently by different individuals. In the following chapters, contributing authors address how they are navigating this divide and transforming their

professional lives in the process.

Design as Innovation Engine

Innovation is not as easy as adding extra readings to the graduate curriculum. Opportunities for exploration and experimentation are needed. The benefits of incorporating design reasoning and design studios in clinical training programs include: (1) The design literature provides structure, guidance, and a long term view of how clinical architecture can evolve over time using systems thinking; (2) it makes distinctions between *innovation* and *fixation* (defined as retrofitting existing processes and activities to new media) and articulates the specific characteristics of what innovation-oriented activity and development look like; (3) and most importantly, much of future product development across the fields of science and healthcare will take place from a position of deep knowledge with no previous object identity as a starting place for designing products and services—design science offers methods for navigating these circumstances creatively (LeMasson et al 2010).

Being well versed in reflection as an important component of psychotherapy training, psychology professionals will be able to make the leap to designing therapeutic environments quite easily. This is not an esoteric undertaking; it will expand students' opportunities for employment in other fields. Metaphorically speaking, it's akin to opening a window and noticing the landscape that surrounds you. It's an integral part of your learning/living environment to acknowledge your surroundings.

We have cast a wide net in featuring a variety of authors and therapeutic disciplines in the chapters that follow. This diversity illustrates epistemological differences between clinical practitioners—but all have the same goal; to facilitate personal growth and healing for their clients. In conclusion, we want to make an important distinction between advocating for the use of new media in clinical settings, and advocating for the introduction of design thinking and design reasoning in clinical academic programs and practices. These are two very different aims: the first supposes that the goal is increased use of technology; the second premise emphasizes the development of designing thinking and design reasoning as starting place for experimentation or exploration of new media. Our book is solely dedicated to this second premise.

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