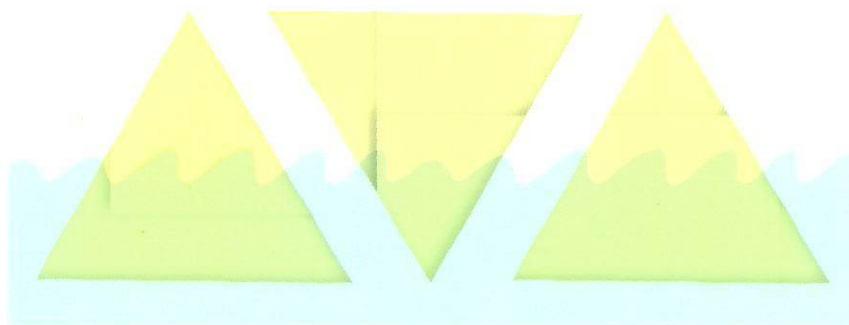# CONVIVIAL TOOLBOX

GENERATIVE RESEARCH
FOR THE FRONT END OF DESIGN

ELIZABETH B.-N. SANDERS & PIETER JAN STAPPERS

CONTENTS

PREFACE

WHAT PEOPLE NEED

This book is dedicated to the memory of Ivan Illich, the radical Austrian philosopher and critic of the institutions of contemporary Western culture, who so succinctly described, in *Tools for Conviviality*, the most basic and underserved need of people.

People need not only to obtain things, they need above all the freedom to make things among which they can live, to give shape to them according to their own tastes, and to put them to use in caring for and about others (Illich, 1975, page 11).

Illich goes on to introduce a concept that he calls 'convivial tools'. To understand what he means by convivial tools , it is necessary to consider his definition of tools. He uses the word 'tools' to refer to *"all rationally designed devices including hardware, machines, procedures, productive institutions such as factories that produce tangible commodities like corn flakes or electric currents, and productive systems for intangible commodities such as those which produce 'education', 'health', 'knowledge' or 'decisions'"*. Tools are the man-made consequences of design and development processes. Illich defines convivial tools by contrasting them to industrial tools (Illich, 1975, *page 20*).

Convivial tools are those which give each person who uses them the greatest opportunity to enrich the environment with the fruits of his or her vision. Industrial tools deny this possibility to those who use them and they allow their designers to determine the meaning and expectations of others. Most tools today cannot be used in a convivial fashion (Illich, 1975, page 21).

Tools for Conviviality was first published in the United States in 1975 (and in Great Britain in 1973), at a time when Illich's insights and implications for the future fell on deaf ears. And so now almost 40 years later, the situation in industrialized parts of the world is at least as bad as Illich imagined it would be. Our tangible and intangible commodities have been tuned and tweaked over those years with increasingly sophisticated industrial tools that promote efficiency and productivity over happiness and creativity. New technologies for automation have taken time and steps as well as worker pride out of the production processes for goods and services. The consumptive mindset has been passed on from generation to generation, growing stronger and more powerful in each transfer. This is particularly true in the United States. In part, the design profession is to blame. As designers, we have become masters at creating and disseminating what Illich describes as *"useful things for useless people"* (Illich, 1975, page 34). It is time to acknowledge that people want to be useful and creative and not just spend their time shopping, buying and consuming.

In introducing the concept of convivial tools, we are not necessarily talking about people making their own products (i.e., end-use fabrication) although that might be an example. The concept of convivial tools is much broader than that. We can interpret and envision convivial tools at many different levels of abstraction to include, for example:
> end-user fabrication of products
> platforms for the creative expression of individuals
> the means for achieving community goals
> methods, tools and techniques for exploring what conviviality might look like and feel like
> scaffolds for collective creativity

Imagine what we will learn about convivial tools over the next 50 years!

WHAT NEEDS TO HAPPEN?

It is time to balance industrial tools with convivial tools. We need to learn how to balance consumptive behavior and lifestyles with more creative behavior and convivial lifestyles. The situation today is looking positive as there are a number of small points of light at the end of the tunnel.

> There is the growing realization that we can't continue living the way we have been living because we simply don't have the resources. The internet has helped us to see first-hand that the distribution of resources is not at all equally distributed, making the need to conserve all the more important, e.g., www.worldbank.org.

> The recession, difficult as it is for many people, is actually helping us to see more clearly what we really need. And it is helping us to realize how good it feels to give to others.

> There is a resurgence in interest in and emphasis on creativity at all levels: in learning, at work and at play (Pink, 2006; Florida, 2002).

> People have dreams for how they want to live and what is most important in life. And we now are beginning to see that people are choosing experiences over stuff (Pine and Gilmore, 1999).

> New information and communication technologies are connecting people to each other and facilitating collective thinking and doing. Social networks, in particular, bring the promise of facilitating more convivial ways of living.

We need to begin to explore what convivial tools will become. How can we make and use them? How can new technology support conviviality? And how can we evaluate the application of new technologies by new human-centered standards for convivial living? For example, can we measure whether the new technologies support people in their needs to:

> Be and feel creative?
> Make a contribution?
> Give shape to the things among which they ca live?
> Put these things to use in caring for and about others?

WHAT IS THE BOOK ABOUT?

This book is about generative design research, an approach to bring the people we serve through desi directly into the design process in order to ensure th we can meet their needs and dreams for the future. Generative design research gives people a language with which they can imagine and express their ideas and dreams for future experience. These ideas and dreams can, in turn, inform and inspire other stakeholders in the design and development process.

This book is about a future that provides for and sup ports the use of convivial tools. Until now, only exper such as designers, engineers and business people have been involved in making industrial tools for people. Such industrial tools include consumer prod-ucts, computer systems, banking and retail services, etc. But the team of experts approach will not work the making of convivial tools. Convivial tools must b made with the people, not only for the people who a being served through design. By co-creating with the people served through design, we can ensure that th tools we design are convivial.

AN IMPORTANT DISCLAIMER

There is one thing that we need to make clear from the beginning. The key idea on which the book is based is that all people are creative. By this we mea that all people have ideas and can contribute to design processes that aim to improve their lives as well as the lives of others. It is a key idea but it is als a controversial hypothesis and we are well aware tho not everyone believes it to be true.

We will not spend time trying to convince you that everybody is creative. We will show how they can be creative in design. We will take their creativity as a given and describe how you can best involve people in the creative process starting in the front end of design. To the extent that you can already see or can come to believe that all people are creative, you will be able to maximize the potential of generative design thinking.

If you don't already believe that all people are creative, the best way to see this for yourself is to get hands-on learning experience. If you never come to see and believe that all people are creative, you can still use the tools, techniques and methods described here to inspire your own creative process.

WHO IS THE BOOK WRITTEN FOR?

This book is for people who work (or who aim to work) in the front end of the design process to innovate in human-centered ways or to facilitate cultural transformation. It is for people who want to change how we live and work and play for the better. It is for people who seek a better balance of industrial and convivial ways of living. The book is also for people who are trying to understand people in deep ways as might be the situation for applied social scientists.

In thinking about who the book is for, the categories don't follow the traditional academic disciplines. The categories are better described as mindsets. Let us explain. In many years of teaching and sharing the ideas about generative design research, we have seen four distinct mindsets emerge with regard to the key idea that all people are creative and can be involved in the ideation, design and development of new products and services that will affect their futures.

> Intuitives
> Learners
> Skeptics
> Converts

The **intuitives** already know that all people are creative. They don't need to be convinced that co-designing has value. They may, in fact, have been operating all along with a co-designing mindset without knowing there was a name for it. They are excited to find that this worldview is finally being given a formal description, which can help them to share their thinking with others.

Others are **learners**. They will come to understand the hows and whys of co-designing after a number of hands-on experiences. They may, through experience, come to see co-designing as their own mindset or they may choose to only pull out the tools and methods to support to their dominant worldview or to differentiate themselves in the marketplace.

The **skeptics** are those who do not believe that all people are creative. It is likely that they were rigorously trained to think of themselves as the experts in their domain. They are not open to co-designing with the people they consider to be less knowledgeable or less creative than they are. Or they may be those who have witnessed a failure of participatory processes before, such as in an ineffective focus group or a commercial co-creation scam that lead nowhere.

The last category includes the **converts**. These are skeptics who, for one reason or another are put into a learning situation about co-designing, and question it the entire time, only to become extremely strong advocates and sometimes even evangelists at the end. It is impossible to distinguish the convert from the skeptic during the learning experience. The converts are a small group of people who might turn out to play a very important role in the evolution of human-centered innovation.

The distribution of intuitives, learners and skeptics varies greatly between different parts of the world, and across gender and generational lines. For example, you will find more intuitives among young women

living in Scandinavia than you will find among American males over t
age of 50 (who are more likely to be skeptics).

Would you consider yourself to be an intuitive, a learner or a skeptic?
How you use the material presented in this book will probably be
different in each case. As an intuitive, you may benefit most from the
frameworks that provide some order and guidance to the process. As
a learner, you will want to carefully consider both the theory and the
practice of generative design research. And even if you consider yours
to be a skeptic, you may find the tools and techniques to be useful. Yo
might find that you are actually a convert once you have the opportur
to learn by doing.

HOW DID WE PLAN FOR THE BOOK TO BE USED?

We have assumed that the primary users of the book will be universit
students at the advanced undergraduate and the graduate levels. Ar
we have planned for the book to be used in a number of different aca
demic departments such as design, psychology, marketing, engineerir
business, communications, education, etc. The material that we cover
relevant to any discipline that aims to understand or improve the hum
condition. The book is particularly well-suited for academic programs
are exploring and offering interdisciplinary and transdisciplinary leari
ing experiences. In that latter respect it may appeal to the **academic
researcher in design**, in that it tries to bring together descriptions of
state of the art methods, their underlying principles, and relation to
practice, which in inter- and transdisciplinary areas is needed to conn
the fields involved.

We also see this book as a preliminary text for the **research practitio
working in industry who is looking to learn about new ways to approc
the understanding of people in order to innovate at the front end of th
design and development process. It can also be useful for **practicing
designers** who find themselves becoming more and more interested i
doing the research that can inform and inspire their own design proce

The book contains practical tips that at first sight are relevant for
practice, not academic research. But with the increasing interest in ar
use of qualitative and situated research approaches, seeming 'practic
ties' (such as do you conduct a session in the offices of the client, in th
university, in a hired place, or in users' homes?) are of importance, an
should be included in the discourse.

And lastly, the book can also be used as a source of practical ideas and inspiration for those who are **already experienced** in the principles and practices of co-designing or human-centered innovation. For example, the frameworks for analysis and communication may offer new ways to think about these activities. The tips may come in handy during fieldwork. And the contributions from our colleagues around the world may provide inspiration for new ways of working.

Keep in mind that the book is intended to be a primer, i.e., it presents the most basic elements for understanding and conducting generative design research. It describes how this approach works and how to get started. It is not a recipe book that spells out in detail how to execute well-defined methods and procedures. For that, the state of the art is still developing too quickly, and also the methods cannot be mindlessly executed. The book presents a toolbox of generative research methods, tools and techniques that can be used to inform and inspire futures that will support community and conviviality.

The book is a convivial toolbox. It assumes that the people who will use the toolbox are creative.

HOW IS THE BOOK STRUCTURED AND WHY?

Because the audiences that we are addressing are varied, we have organized the book to offer options in how it is used. There are four main parts.

> *Underlying principles.* The first part introduces the basic components of generative design research and provides a broad theoretical background for support and grounding.

> *Getting a sense of scale.* The second part consists of four cases, ranging from a very small project that was executed by a group of students over a few days to a very large, global project that involves many different team members

working together over several months of time. The cases were selected to show the range of applications of generative design research, give a sense of scale and complexity, and illustrate how the many different aspects and stages discussed in part 3 fit together in practice. The two smaller cases describe real projects. The two larger cases are hypothetical cases that have been formed by combining bits and pieces of many different client-sponsored projects that the first author participated in over many years as the project manager in design research firms. Client-sponsored work is generally proprietary so we have taken the hypothetical case approach to introduce you to many different types of experiences that have actually taken place.

> *The mechanism.* The third part is the how-to section that describes how to plan, gather, document, analyze and communicate the data from the generative design research process. There are no explicit recipes for successful generative design research in the how-to chapters because there are many options from which to choose. Instead of recipes, we offer frameworks for the reader to use in considering the most relevant options based on the objectives, time frame, skills, etc. at hand.

> *Samples from the field.* Throughout the book are 50 contributions from a diverse range of people in the field. These provide examples and instantiations of tools, highlight specific aspects of theory or practice, or relate experience and practical tips. They also show how the techniques are used in different places and across disciplines.

Students will probably want to read all the parts in order. Research practitioners may be most interested in reading the cases, followed by the how-to section. Practicing designers will likely want to read all the

contributions first to see if this is the way they would like to work in the future. Educators may want to link the principles of the first part to the tips of the later parts to further the fundamental understanding in their students. Experienced co-design researchers may find the frameworks for action that appear throughout the how-to section are the most useful in giving them new ways to expand their repertoire.

ACKNOWLEDGEMENTS

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DESIGN STUDENT TO DESIGN RESEARCHER: FROM 'EXPERT' TO 'TRANSLATOR'

A degree in visual communication design left me equally prepared and unprepared for the skills that I would need in my future role as a design researcher, as the diagram below shows. The true challenge came not from acquiring the needed practical research skills, but from the change in perspective that practicing design research required.

In design school, we were taught to be 'experts': to use our creativity to come up with great ideas or turn everyday ideas into something compelling. Shifting to the participatory design mindset meant learning to be the facilitator and translator of ideas rather than the creator.

It was no longer about being the 'expert' and coming up with the ideas, but instead about using creativity to find new ways to help everyday people share their ideas and experiences, and then using design thinking to translate those stories into frameworks that inspire new design directions.

how well did my degree in visual communication design prepare me for a career in design research?

PRACTICAL SKILLS DESIGN SCHOOL **DID** PREPARE ME FOR

FLEXIBILITY

willingness to iterate on ideas

doing whatever it takes to get things done

CREATIVITY

using design thinking to solve problems

exploring new research tools and methods

brainstorming ideas

synthesis, building frameworks

planning fun activities & workshops

COLLABORATION

working on projects in a team environment

engaging multiple perspectives (cross-disciplinary)

thinking & working up on the wall

VISUAL THINKING

storytelling, speaking in examples

speaking in pictures rather than words

using diagrams to represent complex ideas & information

PRACTICAL SKILLS DESIGN SCHOOL **DID NOT** PREPARE ME FOR

PROJECT MANAGEMENT

managing budgets

coordination & scheduling resources

client & vendor communication

BUSINESS STRATEGY

understanding current business practices

making business strategy recommendations

PRODUCTIVITY SOFTWARE

entering & analyzing data in Excel or similar

building findings, diagrams, & presentations in PPT

STRUCTURED, LINEAR THINKING

creating charts & graphs

crafting succinct observations

calculating percentages & stats

thorough analysis

bullet points!
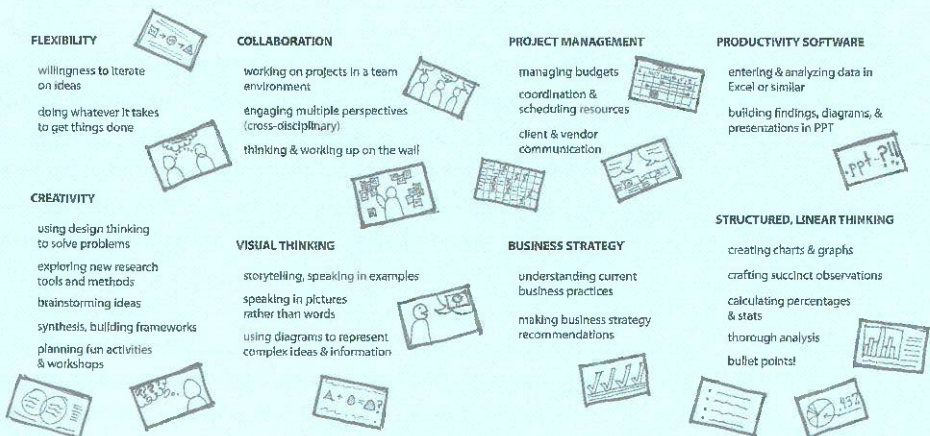
PART1
BASICS

INTRODUCTION TO PART ONE

This book is about generative design research, an approach to bring the people we serve through design directly into the design process in order to ensure that we can meet their needs and dreams for the future. Generative design research gives people a language with which they can imagine and express their ideas and dreams for future experience. These ideas and dreams can, in turn, inform and inspire other stakeholders in the design development process.

Part One introduces the basic components of generative design research and provides a broad theoretical background to ground the discussion. Here we introduce the key idea of the book, i.e., the view that all people are able to bring creative contributions to design processes. We also describe a number of related theories and observations from social and cognitive science because the way generative tools and techniques are structured and conducted is based on an understanding of how people think, feel and act. After the theoretical grounding, we will introduce the basic building blocks of generative design research.

The chapters in Part One can be used as a stand-alone resource. For example, if you want to understand the why behind the tools and techniques of generative design research, these beginning chapters provide a framework for understanding, adapting, and further developing them. On the other hand, if you are looking primarily for how-to information, you may want to skip over Part One initially, and focus on Part Three. But you will want to return to it later since the first three chapters contain explanations underlying the practical information. The explanations in Part One will be called upon regularly in Part Three where we provide information on how to plan and execute generative design research. These explanations will help you to generalize from localized tips to broader applications as you explore further.

CHAPTER 1
INTRODUCTION

OVERVIEW OF CHAPTER ONE

In this first chapter we will describe generative design research by connecting it to theoretical and practical precedents, and situating it in current practice. We will position generative design research with regard to business and marketplace contexts as well as within recent developments/trends in design and design research. We will explain the emergence of the design research landscape, and the place of generative design research tools and techniques within it. We will also describe how the roles of the different stakeholders in the design development process have changed over time. We will conclude Chapter One by describing three perspectives on how co-creation and generative design research can be used.

WHO IS CREATIVE?

Everyone is creative. In fact, people are particularly creative with regard to experiences that they are passionate about such as living, playing, learning and working. But many people do not engage in creative activities in their everyday lives. They see creativity as something that is meant for children, not adults. Or they believe that only certain people such as artists, musicians or designers are capable of being truly creative. Since many adults in our society don't engage in creative activities regularly, they may not see themselves as being creative.

But people today want to be creative and to engage in creative ways of living. This hypothesis comes from the many years the first author has spent with people in their homes, workplaces and schools in her role

as a generative design researcher. The single most consistent aspiration that people express for their own futures is the need to be and to feel creative. They communicate this whether they are at home or at school or at work. People want control over how they live, where they live and what kinds of products and services will best support them in doing so. The dream people have to engage in creative ways of living is not only pervasive, it has been gaining ground quickly in the past decade.

WHY ARE PEOPLE EXPRESSING A NEED FOR CREATIVITY NOW?

Why is the need for creativity so consistently expressed today? It is an antidote to consumerism. We have been living in a consumer-driven culture for some time now. Starting in the 1950's, consumerism has grown, leading to conspicuous consumption which has been growing ever since. People are seen as customers and consumers who live in the marketplace. Businesses are interested in people only in so far as they shop, purchase and then own and use the products or services that are designed, produced and sold to them. Design as a profession has traditionally been focused on serving industrial production for the marketplace. So design students have been trained to design stuff such as products and packages and communications that help people to consume goods and services.

Conspicuous consumption has resulted in many nonsustainable products and practices. In fact, many consumers are not even aware of or are confused about the negative environmental impacts of their behavior. Consumerism has also led to a preoccupation in the business sector with innovation at all costs. In fact, even innovation is not enough. It is 'radical innovation' (Verganti, 2009) that companies seek in order to stay ahead of the competition.

Fortunately, a countermovement to this pattern has recently become evident. The recession has made

it abruptly and abundantly clear that continuous conspicuous consumption can no longer be maintained. And at the same time we see that many are seeking ways to be socially and environment responsible. This is true for individuals as well as large, established corporations.

People will always be consumers of products, ser and experiences. But what they need now is a b between the consumptive activities and the abilit to engage in creative activities. They need to be to choose for themselves when to be consumers when to be creators. They need opportunities to better choices, including choices about how to liv only choices about how to spend and consume.

BUSINESS AND DESIGN ARE CHANGING

Manifestations of change can be seen at the inte tion of design and business. One of these is the r interest and enthusiasm in what is called 'design thinking' (Martin, 2009). Design thinking is alrea of such interest that business schools at universit around the world are attempting to revamp their ricula to meet the needs of business students who not want to play the 'business as usual' game.

Another major sign of change is the practice of c creation at all stages of the design development p cess (Sanders and Simons, 2009). Co-creation car seen at all points along the process. The applicati of the concept range from co-creation at the front of the design process where the potential for suste able innovation lies to co-creation at the tail end design development process where the potential f brand loyalty lies. We will talk more about the rela ship between co-creation and its position in the de process later in this chapter.

Yet another manifestation of change at the interse tion of business and design is the rise of creative activity seeking by everyday people. The growth of

DIY (do-it-yourself) industry and the resurgence of crafting at all levels (e.g., Stewart, 2009 and Sedaris, 2010) is a strong indicator that people are seeking ways to express their creativity. The rise of social networks and other means of online sharing have contributed widely to this phenomenon. www.etsy.com is a good example. The rise of creative activity seeking by everyday people may be a reaction against the overemphasis on consumption over the past 50 years. Or perhaps it is a seeking for the 'convivial tools' that Illich (1975) described over thirty years ago?

The changes in the business marketplace are impacting the disciplines of design and design research. The shifting foundations of the design disciplines are described in the chart below (see Figure#1.1) which shows that we are in the midst of a transformation. Design has been, until recently, primarily concerned with the making of 'stuff'. The traditional fields of design education are characterized by the type of 'stuff' that designers learn to make (e.g., industrial designers make products, architects make buildings, etc.). Prototypes made during the traditional design process represent objects such as possible products, spaces or buildings. The languages that designers learn in school are specialized for the creating of such objects. For example, traditional design embodiments for making stuff include sketches, drawings, prototypes, and models of objects, often in isolation.

OLD > THE TRADITIONAL DESIGN DISCIPLINES	NEW > THE EMERGING DESIGN DISCIPLINES				
visual communication design	design for experience	design for service	design for innovation	design for transformation	design for sustainability
industrial design					
interior space design					
architecture					
interaction design					

Figure#1.1: The disciplines of design are transforming from a focus on the objects of design (old) to a focus on the purpose of designing (new).

Design practice is now moving from a preoccupation with the making of stuff to a focus on making stuff for people in the context of their lives. The emerging design domains on the right side of the chart are focused on the purpose of designing, e.g., design for the purpose of serving or healing or transforming. Thus, in these new design domains, there is the need for alternative forms of conceptualization and embodiment beyond 'stuff'. Some of the alternative embodiments for describing and enacting experience that are being explored today include stories, future scenarios, narratives, performance art, documentaries and timelines of experience. In addition, personas (hypothetical yet representative people) are frequently used to ensure that people are a focal point in the design process.

The new and emerging design domains are bigger and more ambitious than the traditional disciplines. The emerging design disciplines require the collaboration of people from many different backgrounds, including both designers and nondesigners.

THE LANDSCAPE OF DESIGN RESEARCH

In the past two decades the study of people as users of products, services and environments has grown both in industry and in practice. We will refer to this area of study as 'design research'. In other words, it is research to inform and inspire the design and development process. The emerging landscape of design research approaches and methods is shown in Figure#1.2 as a map.

Why make a map? Making a map is a way to hold a domain still for long enough to be able to see the relationships between the various approaches, methods, and tools. Maps are good for visualizing relationships, finding dense and empty spots, and spotting opportunities. Maps can be useful for showing complexity and change. For example, the underlying landscape of the map may be relatively permanent, changing only as

major forces affect it. But the tools and methods shift and change somewhat like trends. And the people who inhabit the landscape may come and go. As in the real world, some people like to stay put and others like to travel. So maps are good for layering complexity and for revealing change as it occurs.

The map of design research is defined and described by two intersecting dimensions. One is defined by approach and the other is defined by mindset. Approaches to design research have come from a research-led perspective (shown at the bottom of the map) and from a design-led perspective (shown at the top of the map). The research-led perspective has the longest history and has been driven by applied psychologists, anthropologists, sociologists, and engineers. The design-led perspective, on the other hand, has come into view more recently.

There are two opposing mindsets evident in the practice of design research today. The left side of the map describes a culture characterized by an expert mindset. Design researchers here are involved with designing for people. These design researchers consider themselves to be the experts, and they see and refer to people as 'subjects', 'users', 'consumers', etc. The right side of the map describes a culture characterized by a participatory mindset. Design researchers on this side work with people. They see the people as the true experts in domains of experience such as living, learning, working, etc. Design researchers who have a participatory mindset value people as co-creators in the design process and are happy to include people in the design process to the point of sharing control with them. It can be difficult for many people to move from the left to the right side of the map (or vice versa), as this shift entails a significant cultural change.

The largest and most developed of the areas on the map is the user-centered design zone. People in this zone work to help make new product and services better meet the needs of 'users'. They use research-
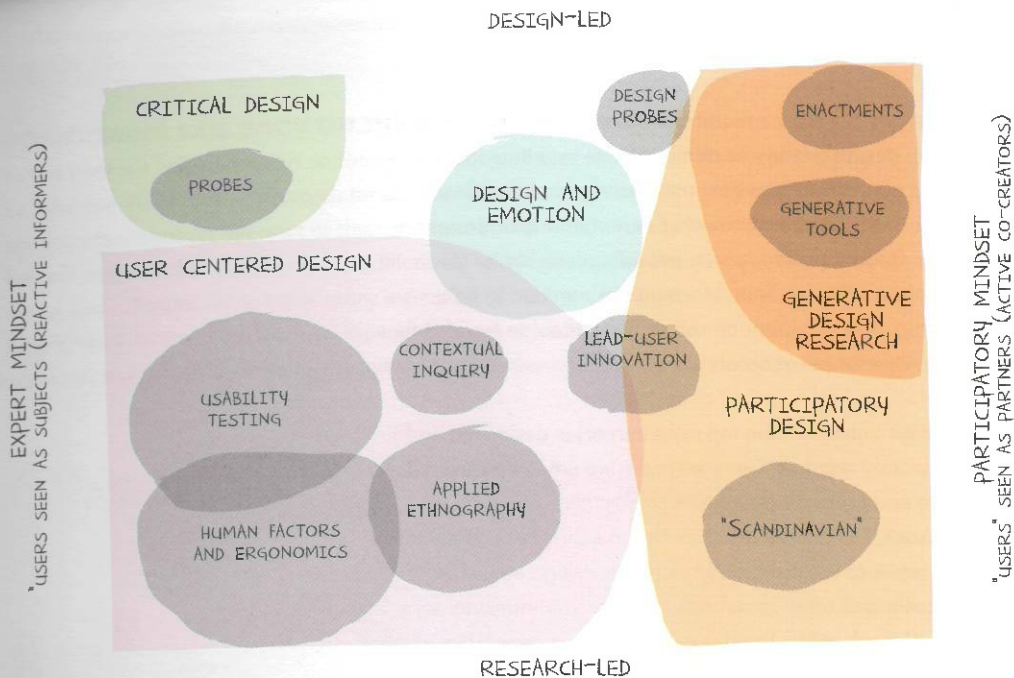
Figure#1.2: The emerging landscape of design research approaches and methods.

approaches with an expert mindset to collect, analyze, and interpret data in order to develop specifications or principles to guide or inform the design development of product and services. They also apply their tools and methods in the evaluation of concepts and prototypes. The three large areas of activity in the user-centered zone come from the applied social and behavioral sciences and/or from engineering: human factors/ergonomics, applied ethnography, and usability testing. There are also two smaller bubbles within the user-centered territory: contextual inquiry and lead-user innovation. (More information about the map can be found in Sanders, 2006).

The participatory design zone spreads across both the research-led and design-led approaches on the right side of the map. Participatory design is an approach to design that attempts to actively involve the people who are being served through design in the process to help ensure that the designed product/service meets their needs. Participatory design attempts to involve those who will become the 'users' throughout the

design development process to the extent that this is possible. A key characteristic of the participatory design zone is the use of physical artifacts as thinking tools throughout the process, common among the methods emanating from the research-led Scandinavian tradition.

The design and emotion bubble emerged in 1999 with the first Design and Emotion Conference in Delft, the Netherlands. It represents the coming together of research-led and design-led approaches to design research. Today Design and Emotion is a global phenomenon, with practitioners as well as academics from all over the world contributing to its development.

The critical design bubble (in the top left corner) is design-led, with the designer playing the role of the expert. The emergence of this bubble came about as a reaction to the large user-centered zone, with its pervasive focus on usability and utility. Critical design evaluates the status quo and relies on design experts

to make things that provoke our understanding of the current values people hold. Critical design "makes us think" (Dunne and Raby, 2001). Cultural probes is a methodology in the critical design bubble (Gaver, Dunne and Pacenti, 1999). Probes are ambiguous stimuli that designers send to people who then respond to them, providing insights for the design process. Probes (in their original form) were intended to be a method for providing design inspiration rather than a tool to be used for understanding the experiences of others.

The generative design bubble (in the top right corner) is design-led and fueled by a participatory mindset. Generative design empowers everyday people to generate and promote alternatives to the current situation. The motto of this book, "all people are creative", belongs here. The name 'generative tools' refers to the creation of a shared design language that designers/researchers and other stakeholders use to communicate visually and directly with each other. The design language is generative in the sense that with it, people can express an infinite number of ideas through a limited set of stimulus items. Thus, the generative tools approach is a way to explore ideas, dreams, and insights of the people who will be served through design. Both critical design and generative design aim to generate and promote alternatives to the current situation. But they operate from opposing mindsets. Many of the new tools and methods that have emerged in the last five years are design-led and sit along the top of the map, spanning the range from the critical design bubble to the generative design research bubble. Some examples include design probes (e.g., Mattelmäki, 2006) and various forms of enactment (e.g., Burns et al., 1995; Buchenau and Fulton Suri, 2000; Ouslasvirta et al., 2003; Simsarian, 2003; Diaz et al., 2009).

Why are the emerging design disciplines shown in Figure#1.1 not included on this map? For example, why are design for service, design for experience and design for sustainability not included as zones on the design research map? It is best to think of the emerging design disciplines as journeys that are taken across the map since they will rely on more than one location on the map. The emerging design disciplines are focused on purpose as opposed to approach or method, and so they can be addressed with either the expert or the participatory mindset. For example, the emerging discipline that is called 'service design' has adopted many of the tools, techniques and methods from participatory design and from generative design research. Time will tell as to whether service designers are practicing with a participatory mindset or whether they are using the tools and methods with an expert mindset.