

# **Design Judgment**

## **Decision Making in the "Real" World**

Harold Nelson, Ph.D., Prof.      Erik Stolterman, Ph.D., Prof.  
Advanced Design Institute      Informatics, Umeå University  
Seattle, USA                      Umea, Sweden  
[nelsongroup@worldnet.att.net](mailto:nelsongroup@worldnet.att.net)    [erik@informatik.umu.se](mailto:erik@informatik.umu.se)

### **Abstract**

Design is about creating the 'real' world around us. Real life is complex, dynamic and uncertain. Truth is difficult enough to know, even with the best science, but 'reality', the domain of human experience, can be overwhelmingly paralyzing and beyond comprehension or understanding. Careful, accurate description, concomitant with clear explanation, is necessary but not sufficient in the quest for enough understanding to allow wise decisions to be made. The value of judgment is that it allows individuals to overcome their paralysis and engage with the messy complexity of life in a way that, when done well, can bring function, beauty, and meaning to human existence. In this paper we will examine judgment, particularly design judgment. We argue that a better understanding of judgment is needed if we want to improve our design ability in an intentional manner. Judgment is a key dimension in the process of design. The ability to make design judgments is what distinguishes a designer as a designer. The ability to make good design judgments distinguishes good design.

## Introduction

*Design judgment* holds many things in common with the other categories of judgment, but the outcome or end is distinct because design judgment facilitates the ability to create that-which-is-not-yet. It is the type of judgment related to creativity and innovation. It is concerned with judiciously crafting the *compositional whole of an imagined design*. When well executed it can create beauty and evoke the sublime. Design judgment is the ability to gain or project insight, through experience and reflection, into situations which are complex, indeterminate, indefinable and paradoxical. This results in the formation of meaning and value by engendering relationships of unity, form, pattern and composition. Judgment is a process of taking in the whole in order to formulate a whole. The outcome of judgment is the *expected unexpected* outcome that yet fits congruently, with integrity, the driving intention behind the design process in the first place. In other words, the operational outcome of any judgment is dependent on the nature of the intention.

In the examination of *design judgment* we have found it productive to distinguish between several types of judgment (these are developed in greater detail in Nelson & Stolterman, 2002). The reason for this is that the complexity of design is such that a too simple definition of design judgment will be both insufficiently rich and impossible to relate to the different kinds of experiences met in design practice.

This paper is based on the idea that design judgment must be made a full and equal partner with rational decision making in any design process. To facilitate this, judgment must be made more intellectually accessible and pragmatically effective. The effectiveness of design judgment is not jeopardized by an improved understanding of its 'nature' as intuition can be threatened by too much self-consciousness. The designerly approach, or perspective, taken in this paper, is based on the conviction that it is possible, through intentional (intellectual) effort, to understand and improve our capacity and skill in making judgments, particularly design judgments.

The ideas presented in this paper are not about making ‘true’ judgments – but are about treating design as an aesthetic and purposive form of making the imagined real by utilizing our ability to make ‘adequate’ judgments. To be more reflective in order to understand more about the activity of judgment will not interfere with the ability to make good or better design judgments. It will only help. Learning to treat design as an informed process of intention and not one of chance or necessity can improve the possibility of achieving good design outcomes.

## What is Judgment

Judgment is a key dimension in the process of design. The ability to make solid *design judgments* is often what distinguishes a stellar designer from a mediocre one. By judgment, we mean that which is at the heart of wisdom, in all of its manifestations. For us, judgment is the means, and wisdom is the outcome. In fact, wisdom can be defined as good judgment, which enables right action, and appropriate change.

Judgment is a form of decision making that is not dependent on rules of logic found within rational systems of inquiry. Judgment, however, is not irrational because it follows its own form of dialectic. In lieu of judgment being founded on strict rules of reasoning, it is more likely to be dependent on the accumulation of experienced consequences of choices made in complex situations. Learning to make good judgments is therefore not a matter of learning to follow the steps of a technique, or to follow directions dictated by a method or algorithm, or to impose the a priori constraints of a theory.

What one acquires here is not a technique; one learns correct judgments. There are also rules, but they do not form a system, and only experienced people can apply them right. Unlike calculating-rules.  
(Wittgenstein, 1968)

Judgment is, by nature, an elusive animal. It is as distinct from rational decision-making, as it is from intuition. Judgment has practical, pragmatic value, and academic rigor, without it being codified and generalized, as reason demands of its offspring, science. We believe the capacity to judge can be designedly learned,

practiced and applied in design circumstances, without destroying its essence and value. This is unlike the case of intuition, where too much intellectual attention is often feared by artists who feel that reason, at its best, is the opposite of intuition and, at its worst, a mortal enemy. The ability to make good judgments is equally as essential in design as it is in business, law, medicine, politics, art, or any other profession. For a skill that is necessary to so many human endeavors, it is surprising that judgment making is so little understood, and so seldom part of one's formal education. Even so, there have been some significant exceptions to the overall lack of attention paid to the formal development of the concept of judgment.

Immanuel Kant, for example, a German philosopher in the eighteenth century, placed judgment as one of three cognitive faculties of human beings. For Kant, meaningful propositions were not just the consequence of empirical fact or analytic logic. They were also the consequence of normative judgment. In addition to his categories of judgments-of-fact, he developed philosophic concepts of judgments-of-ethics and judgments-of-aesthetics as well. His concept of aesthetic judgments (Kant, 1790) is not focused on the same outcomes as the concept of design judgments developed here but there is some influence never the less.

John Dewey (Dewey, 1910) stated that there is an intimate connection between judgment and inference. The intention of inference is to terminate in an *adequate* judgment that is equally a *good* judgment, through the interpretation of facts. According to Joseph Dunne (1993), John Henry Newman, a nineteenth century Christian apologist, proposed that judgment was made possible by the intervention of the *Illative Sense*, which informed reasoning leading to *correct* judgment. In Dunne's book he develops his own, well-grounded, argumentation for judgment by elucidating the distinction between the two Aristotelian forms of knowledge; *techne* (Gr. productive, technical knowledge) and *phronesis* (Gr. practical, personal knowledge). Dunne argues for an understanding of "practical wisdom" that makes it possible to take the complexity of reality into account.

More contemporary examples of judgment focused scholarship, with close relationships to the present work on design judgments, includes the seminal contributions of C. West Churchman (1968). Churchman defines judgment as a

“well substantiated” belief, a belief held collectively by a group, in contrast to a belief held by an individual. Sir Geoffery Vickers (1995) is known for his development of the concept of *appreciative judgment* in public policy design. Appreciative judgment is the capacity to understand, or *appreciate*, a situation through the discernment of, what is to be considered as background and what is to be considered as foreground, in the formulation of a project context. Horst Rittel, another example of someone who has formally developed the concept of judgment making, focused his attention on the fields of design and planning (Rittel, 1972). Rittel went so far as to state that every logical chain of thought is ended only by an *off hand judgment*, one of several types of judgment he considered, and not by reasoned decision making.

A lack of appreciation for judgment as a legitimate means of decision making is not only revealed by its absence in curriculums, and professional discourse, but by the negative connotations one hears, regarding judgment, in everyday conversations. These conversations are full of comments that are indicative of the distrust of judgment: “Don’t judge me!” “Don’t be judgmental!” “That’s only your judgment!”

Judgment can best be understood when it’s considered within the context of knowledge, knowing, and the knower. To put it simply, judgment is knowing, based on knowledge that is inseparable from the knower. By this, we mean that judgment is based on accessing knowledge generated in the particularity or uniqueness of a situation; knowledge that is inseparable from the knower and is only revealed through the actions of the knower. This is in contrast to decisions that are made, based on knowledge that can be—and is of value primarily because it is—separable from the knower.

Judgment knowledge cannot be stored in libraries or on databases. Colleagues in controlled experiments can’t replicate it. Neither can it be memorized, or accumulated in any quantity so as to build a field of expertise. Judgment knowledge has instrumental value only for a particular situation, and loses its direct and immediate relevance in the next setting. Therefore, it becomes clear that while separable knowledge deals in that which is universal, or generalizable, the inseparable knowing of judgment deals with particulars and ultimate particulars. This implies that designers can learn to make better judgments, but

cannot learn—a priori—the kind of knowledge necessary for particular judgments at the moment they occur. Skills and competencies can be practiced and mastered, in support of future actions, but should not be confused as knowledge from judgment itself. Scientific knowledge, the ultimate separable knowledge, plays a necessary supporting role in good judgment making, but is very different in character from the knowing that's embedded in judgment.

Knowledge that is separable is part of a continuum of knowing that moves from data, to information, to knowledge. There is no similar continuum in judgment knowledge. However, there is a connection to what has traditionally been considered wisdom. The outcome of good judgment—wise action—has been considered, directly or indirectly, as evidence of wisdom.

Given these general definitions, we will examine judgment, and especially design judgment. We argue that a better conceptual understanding of design judgment, in its different specific manifestations, is needed if we want to intentionally improve our design ability. Although design judgment cannot be separated from the designer, the designer can reflect upon the nature of judgment making, and begin to approach the ability to make good judgments as an essential key to accessing design wisdom.

Unfortunately judgment is often dismissed as an inappropriate means of decision making. It is also deemed to be an unsuitable foundation for action or belief. Judgment is put into the same category as mere opinion or conviction, which, since the time of Socrates, has not been considered a legitimate form of knowledge in the Western tradition. Thus, it has not been considered to be a fit candidate for accessing design wisdom, the necessary condition for right action (It is paradoxical that we often receive the advice to “Trust your own judgment,” when others want some demonstration of our personal accountability).

Judgment is also touted as the enemy of creativity. Students of creativity are constantly admonished to suppress their judgment, to hold it in abeyance, and allow the free flow of their ideas to emerge. Creativity and innovation are often proffered as the polar opposites of judgment. In reality, though, well-managed judgment is a necessary component in the synthesis activity of creativity and

innovation. Without exercising judgment, creativity is diffuse, and innovation rootless.

Judgment is acceptable in day-to-day settings in the arenas of life that traditionally require judgment calls to be made. Judges are required for beauty contests, in order to decide who is the most 'talented', and in sports competitions to make decisions on whether a specific behavior is good sportsmanship or not. Judgment takes on its most serious role in the realm of law. Judges, in this case, are expected to make considered judgments, based on their own experience, as well as their understanding of the qualitative and quantitative truth of a particular situation, as compared to an idealized code of law.

And not to be forgotten is another form of judgment that has concerned humanity for millennia, often called "the final judgment". In this situation, a supreme deity sits in judgment of an individual's life, in anticipation of the inevitable end of worldly existence, and the beginning of eternity. The anxiety and fear of this form of final judgment filters into attitudes towards more corporeal forms of judgment that carry the threat of punishment from some authority figure. Police, judges, bosses, parents, teachers and others with positional authority are confronted with negative reaction against their actual or potential for authoritative judgments. The antagonistic reaction to this kind of ultimate authority and power over the measure of an individual's worth, often results in the rejection of the idea of judgment all together.

Our distrustful attitude toward judgment is quite fascinating when you stop to consider that people are engaging in judgment all the time. It is as common as breathing. In fact, nothing would ever get done, without small or immense judgments being made by people all the time.

This is because real life is complex, dynamic, and uncertain. Fact is difficult enough to know even with access to the best science, but reality, the domain of human experience, can be overwhelming, and beyond comprehension. Careful, accurate description, concomitant with clear explanation, is necessary but not sufficient in the quest for enough of the right kind of knowledge to allow wise decisions to be made.

Therefore, without the capacity to authentically use judgment, there often emerges a situation, commonly referred to as the ‘paralysis of analysis’, and its frequent companion, ‘value paralysis’. These two types of paralysis result from the popular assumption that decisions need to be based on a comprehensive, factual understanding of a specific situation. Further, this comprehensive, accurate understanding, imbued with rational logic, will eventually lead to the ‘correct’ solution. It is also assumed that this approach renders results not swayed by any personal preferences. In other words, that it is an objective and unbiased process. Due to their aspiration to be comprehensive, approaches like this often lead to oversimplifications at the same time as they lead to endless efforts in finding and analyzing all the ‘necessary’ facts and information.

This is because to be comprehensive means to deal successfully with an unimaginable amount of data and information. In order to deal realistically with the complexity and complication of large amounts of information, within a reasonable amount of time, it is necessary to find ways to simplify. This means ignoring or leaving things out that cannot easily be characterized. It also means using generalized abstractions to stand in for the multiplicity of particular constellations of sense data. In the process of simplification and generalization, nuances and subtleties are lost. Even things that are obviously apparent are lost because they are not easily understood and conveniently accessible through descriptive or explanative frames of reference. There is, obviously, a danger in not dealing with the full richness and complexity of reality.

The value of judgment is that it allows individuals to overcome these forms of paralysis, and engage in the messy complexities of life in a way that, when done well, can bring function, beauty, and meaning to human existence.

Formal, rational decision-making processes are often held up as the standards to be used by businesses, governments, institutions and foundations, and even by individuals, when one must engage in complex, dynamic issues. The irony in this, is that decision-making, based on rational analysis alone, actually creates more options and divergence, than it does convergence (in the form of focused outcomes). This is true, even when there are resources and time enough to allow a comprehensive process to unfold. Judgment, on the other hand, is a convergent process. It brings diversity and divergence into focus; that is, it brings form and

meaning to messy real-world situations. Best of all, it is ‘on time’ or ‘in time’ which means that it takes place within the constraints of a reasonable time frame based on a time line of realistic expectations and limitations. This is the ‘discipline’ of judgment. It is making good choices in a timely way without the delays associated with never-ending studies.

We believe that judgment is a basic human activity. But, what exactly is this phenomenon? There is not just one kind of judgment because reality presents itself to us with such a full richness and complexity that it compels us to develop different configurations of judgment. In any complex situation—where there is a particular purpose and need to make decisions and take actions—we rely on a number of different types of judgments. These include: intellectual judgment, practical judgment, ethical judgment, esthetic judgment, professional judgment, and design judgment.

These various kinds of judgment relate to specific aspects of our experience of reality. People use these judgments to deal with the opportunities, problems, questions, and uncertainty they face. Keep in mind that we never find any of these judgment types in their pure form, there is always overlap between them. Because we are interested in how judgment affects us as designers, we will focus more intently on the phenomenon of *design judgment*.

## **Design Judgment**

In our examination of *design judgment*, we have found that it actually encompasses several different types of judgment. For instance, as designers, we face situations where we may have to make an overall judgment on the quality of a specific material or personnel used in a design. At other moments, we may have to judge how the chosen parts of a design fit together as a whole—as a composition. These two situations are not only different in their focus, they also reveal how different the act of making a judgment can be, and how our skills and knowledge underlying a judgment may differ.

We do not claim that the types of judgment presented below are the only possible ones, and we want to be careful to recognize that we are only talking about *design*

*judgments*—this is not a discursive, generalized theory of judgment. Also, this not an attempt to define design judgment as residing in the realm of the *true*, instead this is a concept that resides in the domain of the *real*. It is an attempt to create an image of design judgment that is practical enough to help designers, and non-designers, better understand how designing works, and improve their competence as designers.

Reflecting on design judgment, we can initially distinguish between *client* judgments, and *designer* judgments. We can also divide design judgments into conscious or subconscious acts.

Before we explore designer judgments, let us briefly discuss client judgments. A client or someone acting on their behalf, first of all, has to make the judgment of intention. For a client, it is always possible to choose -- or not to choose -- design as a way to *approach* a situation. The client can make the judgment that design is not the appropriate approach, and may instead choose a problem-solving approach, a political approach, or even a management or spiritual approach. *Design is, in every situation, only one of many options.* And sometimes design is not necessarily the right option. If a client needs an approach that will lead to a guaranteed, and predictable, result, design is not appropriate, since it is about creating the not-yet-existing, which, by definition, is always a risky business. This judgment of approach, if made in favor of design, marks the entry into a design project and is always made by the client or surrogate client.

Once within the design process, the client or client's agent must make a *judgment of purpose*. It is the client who has to make the overall judgment about the purpose of engaging in a design process. This does not mean that the client necessarily will decide what has to be the outcome of the design. By this judgment, the client will set the stage for the design process, and also provide the designer, or design team, with a first approximate direction for all energy, thoughts, and actions.

In the design process, the client is also responsible for making judgments of *worth* or *value*. A designer can never make that judgment on behalf of a client. He or she might be able to suggest, or try to influence, or educate a client to appreciate

certain qualities and certain design consequences, but the final judgment of the worth and value of a design is in the hands of the client.

These client judgments ought to affect the designers' judgment on whether or not to serve the client in the first place. The making of these seminal judgments by the client not only creates restrictions on possible actions by the designer, but also instills accountability and responsibility by the designer, concerning the systemic effects of the judgments. There is rarely a clear demarcation, however, between these client and designer judgments, because of the mutual influence clients and designers have on one another. This means that the judgments made by the designer have an impact on the clients' realm of judgment. These initial judgments are also modified and refined throughout the design process by the cross-catalytic effect of judgments being made in the different domains of responsibility.

It should be obvious, at this juncture, that the client does not merely provide an entry point into the design process. The client plays an ongoing role throughout the design process, by having the responsibility for the judgments described above. Design judgments are never made once and for all. New ideas, creative changes, changed preconditions, and increased understanding and knowledge, all change the context for the judgments made. Judgment making in design is fully dynamic, and dialectic, between conscious and subconscious judgments, and between client and designer judgments.

Designers are expected to make a lot of judgments and are held accountable for their consequences. But since these judgments are not all of the same type and, depending on which category of judgment the designer is engaged in, different strategies and tactics are demanded, which require different commitments of time and energy.

The entry point -- or gateway -- for a designer into a design process is marked by an altruistic judgment of whom to serve — the judgment of *service*. Once this judgment is in place, with all its concomitant relationship-building, contracting, and related activities, a design project can be initiated.

Within a design project, we divide designer judgments into ten different types. These judgment types are described in greater detail elsewhere (see Nelson & Stolterman, 2002), here we will only briefly introduce them. Our only purpose here is to make the case that a better understanding of design judgments is fundamental to the further development of a designer's competence. Just as the client is responsible, and accountable, for client judgments—*approach, purpose, and worth*—the designer is fully responsible, and accountable, for the ten presented below in figure 1.

- *Default judgment*—internalized judgments of skill
- *Deliberated off-hand judgment*—experiential learning judgments
- *Appreciative judgment*—discernment of foreground from background
- *Appearance judgment*—judgments of style, nature, character, and soul
- *Quality judgment*—judgments of excellence and worth
- *Instrumental judgment*—judgments of craft
- *Navigational judgment*—judgments in the moment in a dynamic environment
- *Framing judgment*—determination of boundaries and limits
- *Compositional judgment*—causing distinction and diversity to stand in unity
- *Core judgment*—subconscious limits of value and meaning

**Fig. 1 Design Judgments**

A designer will in any design process face situations where all or some of these types of judgments are needed. In summary, both clients and designers are elements in a compound relationship, which is animated by the interaction of

many different types of judgment. Judgments are continually being made, and then refined, throughout any particular design process. Each set of judgments, whether designer or client related, must be made by the accountable individual(s). If, for instance, clients allow the designers to make judgments of purpose and/or worth, then the process becomes one of art, rather than design. If, on the other hand, the clients are encouraged to make judgments regarding composition, or framing and containing, then it becomes a process of facilitation, rather than design.

The key idea is that design is a system of relationships, which include a variety of roles and responsibilities (such as designers and clients), from which design activity, and outcomes, emerge. It is a composition that depends on the interaction of different design roles for the emergent quality to be produced, in the same way that oxygen and hydrogen combine to form water. Wetness is an emergent quality, not present in either type of gas, when observed in isolation. Similarly, the role of designer cannot exist out of relationship with a client, because design action is an emergent quality.

This plethora of judgment types creates a rich 'map' of complex relationships. In a design situation, neither the client nor the designer can use this map as a guideline, not even when the meaning of the different judgment types is more developed. Its purpose is instead to make us realize that design is a process, fully guided by design judgments of astounding variety and type. There is no temporal aspect in the map, and there is no priority to the type of judgments necessary. In real situations, these judgments are made all the time, in a completely dialectical relationship. Of course, certain design processes do demand more of specific kinds of judgment, while others demand less. Yet, the map is still valuable as a tool for reflection, and as an intentional aid for improving one's design ability. The map can even be used as an analytical tool. Such an analysis might be helpful, to explore one's own way of approaching a design task.

We must address at least one more type of judgment, and that is *mediative judgment*. All the previously discussed types of design judgments will, in one way or another, contribute to the final design. A designer therefore needs to make a judgment on how this whole should be orchestrated. Thus, he or she must balance

and proportion the different types of designerly judgments using mediative judgment.

A *designed whole* is the emergent consequence of all the judgments made in a design process. It is a synthesis of three wholistic domains: the adequate whole, the essential whole, and the significant whole.

The meaning of the concept of ‘whole’, in relation to judgment in design, is one of the most crucial things to understand about design; in effect distinguishing it from other intellectual traditions. Design judgment has a special character, since the resulting design is something produced from imagination, something not-yet-existing. In its various forms, design judgment relies on all our capabilities as humans. It is based on intellectual and conceptual thinking, as well as aesthetic and ethical considerations, and its fundamental starting block is the character of the designer.

## **Conclusion**

As stated at the beginning of this paper, we believe that design judgment is a full and equal partner in any form of design inquiry, on a par with rational decision-making. Design judgments are not weakened by an improved understanding of their nature, as opposed to the mystery of intuition, which can be threatened by too much self-consciousness. The judgments that constitute design, as illustrated in this paper, are based on the conviction that it is possible, through intentional intellectual effort, to understand and improve our capacity, and skill, in making any judgments, especially design judgments.

Again, we should emphasize that we are not talking about making *true* judgments. Rather, we are talking about treating design as an aesthetic and purposive approach, whereby we make the imagined real, using our ability to make good *adequate* judgments. Design is about making crucial judgments, ranging from reflexive off-hand judgments, to judgments emerging from our core being. It is about an appreciation for the whole, and all its systemic relationships. Therefore, being more apperceptive, in order to understand more about the self-conscious

activity of judgment, will not interfere with a designer's ability to make good design judgments. It will only help to improve those judgments.

This leaves us, as designers, fully responsible for our judgments and our actions. There is no way of escaping this responsibility. Designers, in relationship with clients, have complete responsibility and accountability, for their designs. This is because they have chosen, based on their design judgments, to make a particular conceptual design into a concrete reality, without the protective cover of 'true' design. This leads us to believe that good design is possible to achieve through good judgment, as an informed process of intention, and not something gained simply by chance or necessity.

(Words 4887)

## References

- Churchman, C.W. (1968). *Challenge to Reason*. New York, NY, McGraw-Hill Book Company
- Dewey, J. (1910) *How We Think*. Boston, MA, D. C. Heath & Co.
- Dunne, J. (1993). *Back to the Rough Ground; 'Phronesis' and 'Techné' in Modern Philosophy and in Aristotle*. Notre Dame, IN, University of Notre Dame Press.
- Kant, I. (1790). *Critique of judgment*. Translation by W. Pluhar, published 1987. Indianapolis: Hackett Publishing Company.
- Nelson, H. & Stolterman, E. (2002, forthcoming). *The Design Way — Intentional Change in an Unpredictable World*. Educational Technology Publications, New Jersey.
- Rittel, H. (1972). "On the Planning Crisis: Systems Analysis of the 'First and Second Generations'." in *Bedrifts Okonomen (Norway)*(No. 8): 390-396.
- Vickers, S. G. (1995). *The Art of Judgment; A Study of Policy Making*. Thousand Oaks, CA, SAGE Publications.
- Wittgenstein, L. (1968). *Philosophical Investigations*, II.xi.

Dr. Harold G Nelson is the President and Co-founding Director of the Advanced Design Institute. Dr. Nelson is working as a consultant to corporations, governmental agencies and educational institutions in the areas of: Organizational Design Competence, Leadership Development, Social Systems Design and Systems/Design Education. He has worked with organizations, universities and corporations, state and national governmental agencies, as well as foreign governments and the United Nations. He is Past-President of the International Society for Systems Science and has been a Fellow in the International Systems Institute. He is presently an affiliated Associate Professor of Mechanical Engineering at the University of Washington. He has been a researcher in both disciplinary and interdisciplinary fields. For over 12 years Dr. Nelson was the Director of the Graduate Programs in Whole Systems Design and the Whole Systems Design Institute at Antioch University. He is a registered architect in the State of California. He can be reached at [nelsongroup@worldnet.att.net](mailto:nelsongroup@worldnet.att.net) or <http://www.advanceddesign.org>

Professor Erik Stolterman is at the Department of Informatics, Umea University, Sweden. In 1991, he received his Ph.D. in Informatics at the same university. His main work is within information technology and society, information systems design, philosophy of design, and philosophy of technology. Stolterman is also one of the founders of The Advanced Design Institute. Apart from the academic scholarly work, Stolterman is engaged in consulting, seminars, and workshops with organizations and companies. He can be reached at [erik@informatik.umu.se](mailto:erik@informatik.umu.se) or <http://www.informatik.umu.se/~erik/>