

Empowering Limitations

Douglas Schuler
The Evergreen State College
2700 Evergreen Parkway NW
Olympia, WA 98505-0002
+1 206 632 1659
dschuler@evergreen.edu

ABSTRACT

This paper explores the nature of a broad range of limitations and the value of coming to terms with them. It's an attempt to help conceive and encourage a shared and coherent vision of computing for the common good that does not rely heavily on market forces and uncritical assumptions about social roles and possibilities in society generally and in computing in particular. Ideally, this exploration will help engender research and action.

CCS Concepts

• **Computers and Society; Professional Responsibilities**

Keywords

Limits of computing; limits of reason; limits of social reasoning; civic intelligence; social responsibility; collective intelligence; social context; rhetoric of technological utopianism; human-centered computing; civil society; education; governance.

1. INTRODUCTION

A limit is an indicator of when a process or activity comes to an end or reaches some other significant point of discontinuity. (An extreme example of a limit is one that keeps a process from starting at all.) A speed limit on a public highway is an example of a limit that is not internal or intrinsically determined. If I bypass that limit I may receive a ticket for speeding. But although my car is capable of exceeding the legal limit (which it seems to do periodically) the car also has inherent limits on how fast it could actually go. I can't force my car to go any faster than those limits and it will ultimately stop working if I try.

Semantically, there are probably differences between limits and limitations, *limitations* being more in the realm of degrading (or braking or throttling) phenomena, rather than *limits*, which suggest more severe and unyielding points. I use the terms here somewhat interchangeably although I suspect that limits are a subset of limitations.

In this paper I focus on a variety of limits and limitations, generally in relation to the roles of people and the roles of technology. I have identified five broad types of limits and limitations which seem to be fundamental. They are fairly distinct in their nature but they interplay with each other in significant

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

Request permissions from Permissions@acm.org.

LIMITS '16, June 08-10, 2016, Irvine, CA, USA

© 2016 ACM. ISBN 978-1-4503-4260-5/16/06...\$15.00

ways. Nevertheless looking at each one individually helps surface ideas about what should be done in relation to it. How we understand and deal with these limits and limitations is critical to sustainability and resilience in this century. And how we cultivate and employ our civic intelligence, our ability to work together effectively and equitably in relation to these limits and limitations, is key to our survival.

2. FACING THE MUSIC: LIMITATIONS REAL AND IMAGINED

Looking squarely at the limits and limitations of our situation vis-a-vis human habitation on the earth seems like a sound, if somewhat naive, suggestion. Not surprisingly, the pursuit of understanding those limits and limitations will also be constrained by a variety of limits and limitations and the fallibility of any findings from this pursuit should also be acknowledged and squarely faced. At the same time, beset with limitations wherever we look, it is not the case that we don't know anything and that accordingly we should not do anything on behalf of ourselves and our planet.

Without necessarily realizing it, we assume that there are no limits to some actions (or processes, activities, efforts, etc.) to which limits clearly exist. On the other hand, while we acknowledge that other activities also have limits, we routinely make the wrong assumptions about them— including, especially, what to do about them. Uppermost, and the main focus of this essay, is the fact that while some of these limitations are truly limiting, others if we can consider them in new ways can actually be *empowering*; Embracing these limitations—and thinking through their implications—is absolutely necessary for increasing our civic intelligence, a threatened, yet renewable, resource.

With a simple example we can see how a "limitation" can become an asset. The life of the entire scientific enterprise depends on limits in our collective knowledge; a question is formed around a deficit, a hole in the knowledge, the objective is to find that knowledge and, even, to uncover additional ignorance.

I'm especially interested in certain limitations, particularly those that seem to be artificially contrived, theoretically capable of being overcome, and, at the same time, the ability to make substantial progress depends on our ability to transcend them. Some of these are limitations of our own social imagination. Focusing on technology and ignoring social realities is a common flaw. We may assume, for example, that the future will be like the past but more high tech: a housewife (or maid) of the future may clean the living room with a nuclear powered vacuum cleaner. On the other hand, we seem to believe that technology, like love, conquers all; technology itself apparently seems to be desirous of a future that provides prosperity to all, forgetting that, for example, technology is almost invariably brought into this world with the intent of enriching its midwives.

The initial probes have revealed five pertinent types of limits and limitations. Each of the types can be characterized by the nature of the limitation (physical laws, ecological factors, psychological or social forces, etc. etc.), its implications for the future—including the possibilities and imperatives for social action—and what could or should actually be done in relation to the limitation. Needless to say the examples don't constitute the whole of the limitations, nor is it always clear which limitation category some things should get shoved into, nor to what degree these limitations can really be thought of separately.

2.1 Inherent Limitations

These include limitations that mother nature has imposed on us. We can rail against them but ultimately it is respect that they deserve because they will have the last word. They include the carrying capacities and resilience of natural systems, as well as conditions that could trigger dramatic, unwelcome climate changes. The value of acknowledging and recognizing inherent limitations means increasing the possibility that humankind doesn't kill itself or otherwise make life a living hell for the earth's inhabitants. (There are other inherent limitations that don't seem to be as relevant... the energy that we receive from the sun in a given year, conservation of energy, the speed of light, etc.)

2.2 Social Limitations

These are limitations that are part of us individually, the ways in which humans interact, and the systems (such as financial systems or national armed services) that we have established to run our affairs. This is a huge category and it includes the countless ways in which we conduct our affairs flawfully. It also includes the interactions between these at the meta-level; for example economic inequality can promote political instability which can promote war and migration which can promote environmental degradation and climate change and on and on. These are the limitations as they currently *exist* but are not well understood or appreciated. The value of looking into these is that there may be ways to recognize the problems they introduce and to reduce their impact if not avoid them completely.

2.3 Myths and Other Social Beliefs

These are the limitations on our thinking that have been more-or-less imposed on us explicitly and implicitly by other people, our cultures, mass media, etc. These are the limitations that correspond to representations or *versions* of rules or other forces that exist and are presumed to be unchangeable. They are often unchallenged or unchallengeable. The value of uncovering misleading social beliefs allows us to criticize them and allow us to take projects that don't abide by their more constraints more seriously. Many of these social beliefs form conceptual barriers that limit our thinking and acting. These include, for example, the idea that computers in the service of instrumental reason can (will!) solve our problems, that we must focus on growth, that research, science, and technology can—and will necessarily—lead to better living for all. There is also a common assumption that computing use is not embedded within powerful social, economic, and political systems that largely determine what happens. Ideologies that rest entirely on a single abstraction such as "freedom" the free market, or even "God's will" also provide significant impediments to our social imagination.

2.4 Disempowering Artificial Limitations

Although it may be the case that this limitation is a subset of the category above, it is useful to highlight this category that specifically addresses the boundaries that seem to be placed on individual and collective efficacy and imagination. I suspect that it is this limitation that should be given particular attention as it

specifically focuses on *action*, not just *realization* of limitation but the commitment to doing something about it. The value of identifying and understanding these disempowering limitations helps us to develop approaches for transcending them. Examples include some of the ways that people rationalize their non-engagement with public affairs by saying, for example, that the situation is hopeless or that they're powerless. Other limitations are not based on self-deception include structural characteristics such as bureaucratic dysfunctionality and norms that restrict interdisciplinary cooperation and discourage action in the public sphere.

2.5 Unregulated Social Imbalances

This is a limitation that paradoxically exists because some forces and institutions are not limited or regulated. These are limitations on social progress that are generally both the cause and effect of vast inequality. It seems that the "freedom" of some people and institutions is the major source of unfreedom for vast numbers of people. It also tends to distort the intellectual sphere for conversations about resources, etc. In a recent study, for example, 62 families have been shown to have the equivalent net worth as the total of all the people worldwide in the poorer half, over 3.7 billion world citizens. In the political realm, to use the United States as an example, the climate denying Koch brothers are planning to spend nearly 900 million dollars to influence the 2016 national elections, a sum that is larger than the sum that will be spent by either of the two major political parties. The value of putting limits on some things that have no apparent limits is in helping to prevent undue control over people and resources such as the amount of money a person can put in an election; the amount of electronic surveillance that can be done; the amount of control over market segments in search engines, online sales, or journalism.

3. CHALLENGING OUR LIMITS

In the face of these seemingly unlimited limits, which of these limits are the most important ones to appreciate and explore? Recognizing the hard limits—especially the ones that are imposed by nature are absolutely critical and they need to be central in formulating ideas for moving forward. In this essay, however, I'm particularly interested in identifying the limits that are more-or-less self-imposed that keep our species from making the progress that it needs to make.

3.1 Inherent Limitations: Mother Nature Takes a Hard Line

The first category of "limits" is revealed when we look at the tight network of global ecological factors. While the limit to carbon emission that humans could produce is not infinite, it's certainly much higher than it is now. We probably have the technological capacity to double our production of CO₂ if the market "demanded" it. But if, as many of us believe, we need to forestall runaway climate change, we need to respect the "limits" that are the results of the complex interplay of life and other processes. In the best case, this response would be that supported by our values and self-imposed on ourselves much like a voluntary speed limit. The more we understand these limits, the better our chances become for respecting them, and not destroying the environment upon which we all depend.

3.2 Social Limitations: Imperfect Humans and the Tangled Webs We Weave

We know—or should know—that human brains are finite. But, of course, the problems with brains are not solely related to their limited capacity. Our brains are filled with wrong-headed ideas—

including thinking that we (individually and collectively) are smarter than we actually are. But being "smarter" is not the answer either—especially if being smarter means being able to solve mathematical problems faster than other people and nothing else. If the "problem" to be solved—the goal to be reached—is how to destroy the enemy, extricate the most ore from the earth, create a convenient society (for some), or accrue the most profit from business or financial sleight of algorithmic hand, the disadvantages that arise from their "solutions" are likely to turn into problems for the rest of us. If Stalin or other historic despots had been "smarter" (or had access to the appropriate "big data") the world would presumably be in a different place today.

The brains that are housed in individual human heads have limits—although it's unclear what they are, how much diversity there is, and how we'd ever be able to find a measure for it (let alone what mischief we might do with it). To me it's enough to know that nobody does—or ever could—know everything. It also seems clear that everybody could probably know *more*—if knowing *more* were the main issue anyway. The important thing is what we *do* with the knowledge we have—including why we do what we do and the impact that our thoughts and actions have.

Regardless of the characteristics of individual brains, nothing of significance (if anything at all) is achieved totally individually. At the core of our knowledge are words that we individually did not invent, processes that we use (such as mathematics) that we did not invent, using ideas, objects, images, etc. that were created by multitudes of thinkers—not by the individual thinking alone, whether in a garret, a bar, or a cave. And, as with individual brains, the ways we form complex ensembles of artifacts, debates and conversations, decisions, knowledge, actions from the interactions among our various brains when we communicate—are compromised by biases, emotions, false beliefs, incomplete knowledge and so many other problems that it's actually surprising that anything gets done at all. In fact merely listing the names of the flaws in human reasoning, both individually and collectively, occupies pages and pages in Wikipedia. But it's not these flaws that necessarily foretell the future; it's what we do with them and about them that matters. Workers need to understand the tools they have at their disposal.

Individually—and with each other—we reason imperfectly and with imperfect information. But things are worse than that. Granted that the intelligence of our individual as well as collective "brains" are flawed, the tight coupling of the systems (Helbing 2013) we've established we can enable the actions in one location to now have unforeseen effects with abrupt severity in a seemingly random location. This shows up in financial systems where devaluation of a currency in one country causes economic turmoil thousands of miles away, but also in environmental systems under stress, of say, climate change. When coupled with the limitation of available time to learn about, adapt to new realities, or prevent serious outcomes, the expectancy of our doing the "right" thing has to be lowered and our risks, both local and global increase. How long can we push problems into the future, assuming (without actually saying it) that we'll have the answers (and the will) to react appropriately? Presumably a better understanding of the risks—at the very least—as well as the necessity of building resiliency and respecting those limits, is absolutely required as we move forward.

3.3 Myths and Other Social Beliefs: Spoken and Unspoken Limitations

There are many myths and other bits of unquestioned conventional wisdom invisibly limiting our potential. Some of these take form in print and in conversation while some seem to

be operating tacitly; like things will ultimately work out fine. This may be true—although there is lots of evidence to the contrary and "ultimately" is a long and imprecise time.

There are (still) some that believe that our leaders (or government) will save us. After all, it's their job! There is also the flip side, another version of wishful thinking that claims we don't need the government at all. The truth lies somewhere in between. Government is an absolute requirement but it too is limited. It *can't* address our problems without us and—if we can take any lesson from history at all—it won't address our problems satisfactorily without active engagement of people outside of government. Other myths abound, generally with "simple" solutions: the myth of self-reliance—individuals can take of themselves with no aid from outside; the "free market" left to "its" own devices (similar to the Internet *wanting* to be the Internet) will take care of everything that needs taking of; and that nature has unlimited resilience.

Some believe that computers will save us. But, computing by itself, will not be able to "solve" the wide range of significant social and environmental problems that we face. While most people, including computer scientists and other professionals, would agree with that statement, the de facto social inertia implicitly suggests that it will. On the other hand, if our intent was to destroy the world, we'd definitely want to enlist the help of computers if we were to achieve our aim with any efficiency.

Computers aren't infallible so it's premature to proclaim that our own brains are useless. In the meantime, large numbers of people are getting the message that their own brain is unnecessary. And computers are being used to project the intent (generally for more money or power) of the people who are shaping the communication infrastructure of the future. Unfortunately these limitations are insufficiently challenged, a limitation in itself which is described below.

3.4 Disempowering Artificial Limitations: Limitations that Just Ain't So

There is general, tacit agreement that people are powerless—or should be. At any rate, they aren't capable of much in the way of enlightened collective action or, for that matter, self-governance. Unfortunately this feeling is often shared by the people themselves. Also unfortunately there is some truth to it. But the social change that is needed won't occur without some basic consent from the people. In fact, it might not occur at all if the main impetus for the change is not coming from the people. Overcoming this limitation is critical and it is possible to do so. But it will take considerable effort.

Unfortunately there seems to be a generally unspoken bias against people who are seeking some sort of social change. Perhaps there is an implication that if someone hadn't already noticed the problem or if they're not actively campaigning against the problem they're complicit. I don't know if this is a basic human trait or something that's encouraged by the media, or culture generally (or both). Some people that begrudge the fact that others are actively pursuing change seem to be operating on the assumption that the right state will *emerge* (somehow) without effort. Maybe the change will take place as an unintended consequence of the billions of human interactions that happen every day by people who are not consciously trying to effect change? But not everybody received that memo... There are zillions of people who are actually *trying* to effect change—but it's not necessarily the change we'd like to see. Fortunately there are ways out of this problem... At least theoretically.

The urgency of the challenges we face highlights the need to transcend these limitations. The immensity of the need is not generally appreciated, nor the importance of working together. The motivation is seemingly missing and is a major impediment. Ideally we could encourage that and the social imagination that is so desperately needed. There is also an assumption that innovation is impossible without technology although I've witnessed lots of it. The Civic Intelligence Research and Action Laboratory that I convene at the Evergreen State College clearly shows that there is immense potential in "ordinary" citizens beyond the usual characterization as consumers. Beyond that, additional tools and support are also needed.

3.5 Unregulated Social Imbalances: Unlimited Freedom for the Few

This section although important is not expanded properly; it's a critical topic but not as critical to this paper (right now). It is and will be interesting to think about how this type of limitation could be transformed into some aspect of research for the CS community. It's mostly focused on undue power and power from computing seems to accrue to people with the resources (money, knowledge, employees) to leverage it. At the same time, this issue is paramount in almost all aspects of governance. Clearly there needs to be limits on what people and institutions are allowed to do. But this simple fact doesn't provide guidance and how best to establish and enforce those limits. One focus could be on transparency in government and financial systems. But this information alone would mean nothing without a concerned and active citizenry.

4. MATURATION: EMBRACING OUR LIMITS AND LIMITATIONS

To summarize: we are quickly approaching significant limits in our ecosystem. These considerably threaten humankind's quality of life, if not its existence. At the same time we seem to be more-or-less convinced that we should do very little. Unfortunately far too often politicians and media pundits distract us from these threats by identifying enemies to smite. Meanwhile we are creating vast computer systems that are used to a large degree for entertainment and merchandising (not to mention surveillance). We are making *things* smarter such as homes, buildings, cars, cities, toilets, roads, guns even, in an apparent effort to reduce our dependence on human collective intelligence.

Acknowledging one's own limitations (in the United States at least) is not done in polite company. It goes against the national grain. In the U.S. one is told that "you can be anything you want to be". In fact, contrary to common sense, there is a not-always implicit suggestion that everybody can be part of the top economic 1% if they work harder and believe in the American dream. While that's obviously not possible, where does this leave us? The answer is clearly not to stop dreaming. We can still dream but let us dream more productively, even about impossible things. As Vaclav Havel said, "We must not be afraid of dreaming the seemingly impossible if we want the seemingly impossible to become a reality."

Exposing one's own limitations is an act of vulnerability and hence is often feared and avoided. Whether by individuals or large institutions denial of limitations tends to be most pronounced by those who most need the help. Acknowledging limitations is clearly an example of self-initiative, a natural step in the problem-solving process. At a recent "Pathways from Prison to Higher Education" conference, a former incarcerated person remarked, "Admitting one needs help is a sign of strength." Will humankind

show that strength by inviting more people into the problem-solving process?

The limitations we discuss here can also be somewhat empowering if we ask the critical questions and look at them with an open mind. To *pretend* that we have all the answers, that easy solutions exist, that more computing power will take care of our problems is folly. When these perspectives are accepted, consciously or unconsciously in support of some action (or inaction?), resources are squandered, the situation is likely to grow worse, and the idea of intentional social amelioration is disparaged. Worse, they postpone the inevitable conclusion that we all bear some responsibility for what happens to our fellow living beings and to our planet itself. Whom but ourselves are we trying to fool?

But just as health is not merely the absence of disease, removing the shackles of myth and other comfortable but counter-productive assumptions is not enough. Embracing our limitations can be a foundation of strength. Orwell was right to point out that ignorance is not strength, but acknowledging our ignorance is necessary for developing our civic intelligence, a collective type of strength.

4.1 Moving on: Making Progress in a Tangled Web of Limitations

Those who profess to favor freedom, and yet deprecate agitation, are men who want crops without plowing up the ground. ... Without a struggle, there can be no progress.—Frederick Douglass

How can people with limitations (i.e. all of us) overcome some of our limitations by working together intelligently? Obviously we have more knowledge collectively than any one person has individually. The challenge of course is to build on the positive development, the potential. Think about what a mess we'd in if we pooled the worst aspects of humankind, the most ignorant, violent, and ridiculous attitudes and beliefs.

For over a decade I've been exploring the concept of civic intelligence [1]. Civic intelligence is intended to serve as a type of critical theory, a social phenomenon in its own right but one that could also serve as an active force to be cultivated, practiced, and rallied behind. Civic intelligence describes the collective intelligence that people use when they address shared problems effectively and equitably. It also describes the collective intelligence that humankind will need if it is to successfully address the issues it faces. Although the expression is not in common usage (as you know), its historical uses were nearly identical to the way I use it (see, for example, [2-4]). It represents both an existing phenomenon (never-zero but often inadequate) as well as something that could or should be improved. It also can be used as an "imaginary" to which we can aspire towards, individually and collectively. If, for example, humans stopped waging war, what steps small and large might have occurred along the way? What beliefs were changed, actions enacted, or examples replicated?

It's important to note that we must not limit civic intelligence as solely a knowledge-based capacity. If for the sake of finding a number that theoretically measured it, we would miss many of its most important elements. Over the years my students and I developed a framework for civic intelligence that included a large number of important capacities [5]. We identified (Fig 1.) many that are frequently omitted, such as self-efficacy, solidarity, and courage as well as knowledge-based ones such as metacognition and salient knowledge.

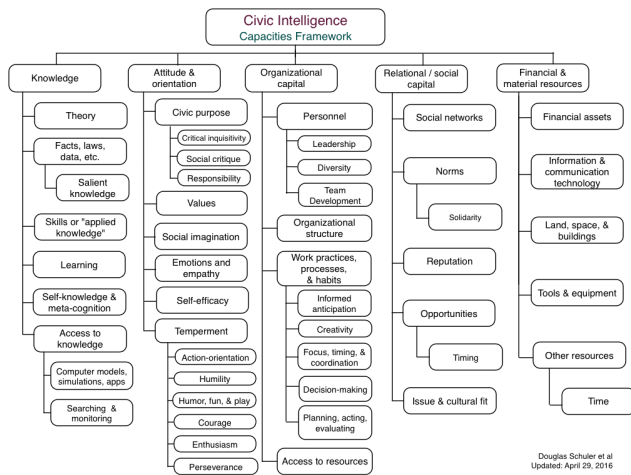


Figure 1. Capacities of Civic Intelligence

The civic intelligence orientation helps to raise questions about current trajectories and ideas for new ones. Intelligence, generally speaking, is what is needed. It can help us to identify what resources need to be marshaled and when, where, and how they would be employed to address one or more issues, to pursue one or more goals. Inherent in this conceptualization is that the intelligence that is necessary must be equal to the task before it. In some ways it must be a reflection of the problem / situation. As things are very complex, so must our approach. Hence we pose questions including the following: What sorts of issues do we face today? What approaches and resources would be needed? What roles could "ordinary" people assume (given the limitations of government and business) and what roles could people in positions of more knowledge, resources, authority, and power play? And, finally, what sorts of things might we do to improve the development and deployment of the civic intelligence we need?

4.2 The Computer Connection

We need Charles Dickens more than we need a computer specialist. —Herbert Schiller

Just as mathematics is the handmaiden of the sciences, computing is the handmaiden of today's economic imperatives. The field of computing, probably more than any other, is at the forefront of economic forces, the enabler of money transfer, data harvesting, micro-targeting, real-time monitoring, sensors and sensor networks, "social physics," smart phones (and homes, buildings, cities, cars, and, even, guns), media empires, financial instruments, algorithmic traders, global investing, etc. etc. But if that weren't enough, it is also potentially at the heart of movements that could fundamentally alter some of the basic aspects of our life. At the same time it has the most potential to alter fundamental aspects of the brain, education, the body, human behavior, war, and even our perceptions of what is real.

In other words, the field of computing has the most potential for intentional and inadvertent manipulation of life on earth—for good or ill. The computer is the primary engine for projecting instrumental reason [6], the mistaken and dangerous idea that all problems can be solved using purely "rational" means. This approach removes people from the picture and reduces them to data or objects. It also takes its toll on the people who think in those terms, whose power of thought is kept down by this reductionistic and, ultimately, inhuman, perspective.

While the consequences of doing this or that in the computing field may result in a transfer of money or power to the people doing it or funding it or otherwise benefiting from the action, this is not in itself reason enough to not do it. It does, however, provide an ideal impetus for thought or critique. Maybe it's not actually the case that a "full-spectrum" computer scientist should exist who could explore and integrate the entire range of attention and influence of computing from theory on one end to broad social implications on the other. It clearly is asking too much for all computer scientists to be active and informed in the total dimensionality of the field. On the other hand, the entire range mentioned above should be well represented and integrated by practitioners in the field and by the discipline and institutions of computer science.

If we are to heed Joseph Weizenbaum's proviso (1976), that the "range of one's responsibilities must be commensurate with the range of one's actions" then computer scientists would need to assume some responsibility for their actions, although the avenues to responsible behavior aren't necessarily well-marked or well-trodden. This is not to say that everything about computers and technology is bad, but it is critical to encourage the line of inquiry that realistically considers their potential drawbacks as well as the social and rhetorical forces that disparage this inquiry. Which of course is just another limitation that must be transcended.

4.3 Roles for Educators and Researchers

While social systems and institutions can change over time due to mutual adjustments without topdown direction (or explicit coordination) there is certainly no guarantee that the necessary changes will be made quickly enough to address emerging challenges nor that systems and institutions that change will be equitable or will have the requisite problem-solving capabilities that are needed. Governments, for example, could—and should—be called in to help resolve social and environmental issues. The recent COPS21 climate change conference in Paris is an example of how that role is being assumed. But, at their best, national governments are unable on their own to solve the type of "wicked problems" [7] that we face today. Moreover, institutionally, their structure and mission don't necessarily inspire confidence. As Lindblom [8] points out, "Designed at a time in which "social problem solving" was not even in currency as a concept, the designers of the Constitution entertained no such idea as creating an institutional capacity for general problem solving." In fact, to make matters worse, the framers may have had something entirely different in mind: "Since in decades thereafter elites thought it advisable to present their designed constitutional order as a great accomplishment of democracy rather than as a superbly designed halfway house to democracy, American thought has ever since been unable to think clearly about the constitutional order."

Habermas [9] has delineated several key roles for intellectuals (such as educators and researchers) that would help them provide useful contributions to civic intelligence through their maintenance of an "early warning system." Particularly he identifies five "unheroic virtues" that, however unheroic they may be, constitute critical tendencies that need to apply to intellectuals and others (activists, artists and journalists, for example) but that could be more prevalent even among the world's citizens:

- "a mistrustful sensitivity to damage to the normative infrastructure of the polity;
- the anxious anticipation of threats to the mental resources of the shared political form of life;
- the sense for what is lacking and 'could be otherwise';
- a spark of imagination in conceiving of alternatives;

- and a modicum of the courage required for polarizing, provoking, and pamphleteering."

One challenging but compelling idea would be to actually build on Habermas' suggestion and strive to develop one or more early warning systems (EWSs) *for the use of the citizenry*. This obviously would not be a trivial undertaking. Developing an EWS is easier said than done yet it seems to be an excellent choice in many ways. For one thing, it provides a relevant perspective for directly confronting many of the limitations discussed here. Ideally, several approaches would be taken simultaneously. Although many obvious target areas such as climate change, economic inequality, and community health emerge, exploring "generic" systems that were intended to integrate multiple and unanticipated issues would be particularly relevant given the complexity of the challenges we face. As our perceptual reach has expanded (via telescopes, microscopes, etc., etc.)—our personal (and collective) perceptual systems are focused on the here and now and our thoughts about the future and our ability to plan in relation to it may be lagging behind.

Systems, approaches, and tools that help remove people from the rest of the world do a disservice to the people by implicitly letting them know that they have nothing to contribute (except money and, occasionally, votes). But beyond the damage to the individuals, the rest of society also suffers as it is deprived of the energy, creativity, and intelligence that non-elites could potentially provide for improving the situation. This is not a small concern. If too many people are disenfranchised and uninformed about the realities of the world, they are more likely to become scientific refuseniks and prone to stultifying and violent rhetoric. We seem to be playing a game of chicken. How much education, support, trust, and opportunities can be withheld from the citizens of a society and for how long without actually destroying the society.

5. CIVIC INTELLIGENCE

A more concerted focus on civic intelligence could result in significant changes in how our world was governed in the broad sense. For one thing, information and communication systems that helped people engage intelligently would be prioritized. This, presumably, would mean working with "ordinary" people to help design new collaborative systems. The goals of these participatory design [10] projects would necessarily be centered in the "real world" and would include connecting people to each other far and wide. It would also mean developing new awareness of our local and global environments and developing new tools for collaboration and collective action. It would mean encouraging the competencies and self-efficacy of non-elite citizens and entering into longterm collaborative partnerships with researchers and practitioners from various disciplines and with a variety of communities. One approach is the development of open research and action networks [11]. Another somewhat audacious proposal is that a global assembly of citizens *could* be developed [12]. While I tried to make it clear that I was not advocating for a precise copy of national parliaments, I did argue for the importance of near-term incremental development of at least the local elements of such a system—stressing that coordination was absolutely critical but it should not come from the top-down.

Ideally we would see more people who thought that positive social change was necessary and perhaps even possible, and who felt empowered enough to think they had a part to play. For my part I have been encouraging a friendly but persistent insurgency of individuals, new collectivities, and alternative projects for a few decades. In keeping with the theme of this paper and this conference, there are, of course, limits to this approach. I am also interested in being part of a community that is explicitly interested

in collective intelligence for the common good. We did in fact start a very loose group (of about 70 people around the world) who are interested in this (ci4cg.org). We would welcome collaboration with this community.

Time is not on our side in terms of building technology and consciousness for the critical mediating structures that we might need. In the global assembly paper I suggested that if these systems aren't built soon, they may never get built. We need to embrace the practical implications of acknowledging limitations and move forward. Limitations means constraints but constraints are reality, part of life itself. The idea of ultimate freedom, i.e. being free of limitations is a pipe dream, not something to spin an ideology around. Becoming cognizant of the limitations that must be respected and of the limitations that are misleading and regressive fictions that must be circumvented are critical steps on the road towards maturity and civic intelligence.

It is widely held but a grievously mistaken belief that civic courage finds exercise only in the context of world-shaking events.
—Joseph Weizenbaum

Although some could disagree, I believe that we do now live in the context that Joseph was talking about.

6. REFERENCES

- [1] Schuler, Douglas. "Cultivating Society's Civic Intelligence: Patterns for a New 'World Brain'." *Journal of Society, Information and Communication* 4 no. 2 (2001): 157-181
- [2] City Club Bulletin, City Club of Philadelphia (February 15, 1911). What is Philadelphia Doing Outside of Her Schools to Cultivate Civic Intelligence?
- [3] Mathews, D. (1985). Civic Intelligence. *Social Education*, 49(8), 678-81.
- [4] Elliott, E., & Williams, G. (2004). Developing a civic intelligence: local involvement in HIA. *Environmental Impact Assessment Review*, 24(2), 231-243.
- [5] Schuler, D. (2014). Pieces of civic intelligence: towards a capacities framework. *E-Learning and Digital Media*, 11(5), 518-529.
- [6] Weizenbaum, J. (1976). Computer power and human reason: From judgment to calculation. Freeman & Company.
- [7] Rittel, H., and Webber, M. 1973. Dilemmas in a General Theory of Planning. *Policy Sciences* 4: 155–169.
- [8] Lindblom, C. E. (1990). *Inquiry and change*. Yale University Press.
- [9] Habermas, J. (2012, August). An avantgardistic instinct for relevances: intellectuals and their public. In *Social Science Research Council: Public Sphere Forum Available at: <http://publicsphere.ssrc.org/habermas-intellecutualsand-their-public/>* Accessed (Vol. 18).
- [10] Schuler, D., & Namioka, A. (Eds.). (1993). Participatory design: Principles and practices. CRC Press.
- [11] Schuler, D. (2008). *Liberating voices: A pattern language for communication revolution*. MIT Press.
- [12] Schuler, D. (2013). Creating the world citizen parliament: seven challenges for interaction designers. *interactions*, 20(3), 38-47.