Generalized Quality

Abstracting a Model of General Globalizations of a Body of Knowledge--Quality--from History of the Total Quality Movement and Applying It to Non-Quality Bodies of Knowledge to Handle Many Forms of Complexity

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RESEARCH QUESTIONS:

1. How did the total quality management movement treat the body of knowledge named "quality" so that it achieved more quality outcomes than prior professional treatment of the same body of knowledge?

2. Can the same abstract operators that TQM applied to quality knowledge be applied to other bodies of knowledge with similar great results?

We have in recent history a body of knowledge--quality--handled by a very unusual, in history, set of what is called here "globalizations" of that body of knowledge, with the result immense improvements in quality all over the industrial world by dozens of nations and millions of firms. These globalizations may represent a new way of handling bodies of knowledge that replace our older "professional" ways of handling them. This paper uses extremely abstract frameworks to identify all operations on quality knowledge involved in the history of the global total quality movement, categorized by each of many "globalizations". It then examines in what if scenarios the application of these operations to other bodies of knowledge, to see what improvements in application of them might be practically realized. The paper also serves as a very abstract overall history of total quality thought, gurus, and methods.

METHOD:

1. Search hundreds of books for statements on sources of complexity and categorize them into a model of a few dozen categories; search hundreds of books for statements on how the total quality movement treated the body of knowledge named "quality" and categorize them into a model of 36 "globalizations".

2. Sources of complexity and traditional ways of handling it are summarized to define very abstractly the overall goal of handling knowledge as done in the total quality movement.

3. The history of treatment of quality knowledge by the total quality movement is surveyed and summarized as 36 "globalizations".

4. In the process of doing 1,2, and 3 immediately above, a model of 256 systems effects, from over 24 academic fields of research is presented, summarizing hundreds of books on topics touching on system effects and general non-linearities in systems.

This paper presents a model of sources of complexity and traditional ways of handling it. It then presents one particularly powerful way of handling all forms of complexity in that model, namely, globalizations of a particular body of knowledge found in the total quality movement. It presents a generalization of this

way of handling complexity by globalizing bodies of knowledge and examines the possibility of applying this generalized model to bodies of knowledge other than quality knowledge. The purpose of this paper is to establish a correct historical model of how quality was globalized in various ways, abstract away quality-related contents from that model, to get generalized operators, that might be apply-able to other bodies of knowledge, besides quality knowledge, to extend their capability of handling the forms of complexity summarized in the model that starts off this paper. Which source and way of handling complexity each globalization applies to is indicated in a final model at the conclusion of the paper.

Passive sources of complexity that work by shrinking scope of actions and actors in the face of situational complexity and active sources of complexity that work by making situations generate surprising effects, both categorized by mental and social contents, are presented, along with traditional means of handling them, either by scaling up the scope of human actors and actions or by scaling down the amount of situation faced. A 30 year sequence of globalizations of one body of knowledge, quality knowledge, that vastly extended the amount and types of complexity that quality efforts in businesses could handle well is then examined, in order to abstract from it generalized globalization operations that might be applied to other bodies of knowledge, besides quality, in order to enable them to similarly handle well large amounts and varieties of complexity. The result of this paper is this generalized model of a sequence of globalizations that can be applied to many bodies of knowledge to make them capable of handling better the forms of complexity in this paper's model.

Along the way this paper presents the most comprehensive models yet published of types of non-linear system effects in society, diverse forms of social diversity, and various emergent new forms of computational system.

RESULT: 36 globalizations that can be applied to any body of knowledge and several dozen sources of complexity with a mapping showing which globalizatons reduce which sources of complexity. This model is a hypothesis, derived from categorizing thousands of statements about how quality knowledge was handled in the total quality movement.

Key Words : Total Quality, TQM, Quality Totalizations, Quality Globalizations, System Effects, Non-linearities, Non-linear Systems, Complexity

Two of Social Complexity's Sources: Social Psych Meets Non-Linear System Dynamics

At the beginning of this century a book of popular exposition of science appeared, to wide acclaim, Gladwell's *Tipping Point* (Gladwell, 2000). It presents social psych research in marketing, influence, media impact, and design, showing how the type of being it describes humans to be, handles a basically non-linear world full of non-tipping points--nearly all inputs have minimal or entirely predictable effects--and some rare tipping points--a few inputs, not at all different from thousands of others, have immense unpredictable effects.   It is this combination, recent social psych images of what humans are like with recent complexity theory research on how nearly all systems in our world are non-linear, that made the book sell so well, it seems. Complexity from limitations of the human mind and complexity from non-linearity of reality get combined. This combination interests a lot of people, it appears.

It has to be admitted that there are a lot of glib references to complexity with every era, from thousands of year B.C. to now, claiming how they, uniquely, among all eras, face exponential increases in rate of change and complexity of system.   Actual research, however, finds little evidence in support of these claims (Plotkin, 1993). Nor has our greater knowledge of non-linearity in the world's systems and the particularities of human social psychology done much to change the overall amount of speed of change or complexity (Johnson, 1995).   Each new frontier understood via knowledge that humans developed, simply exposed further frontiers as human goals expanded to go beyond present achievements and limits (Bailey, 1996).

Economics, queen of the social sciences using government-paid-for databases that allowed physics-like equations as models (if totally unrealistic assumptions about human nature were accepted) recently has been defeated by twin attacks, proving that the assumptions about maximizing utility that make its math simple (the recent Nobel Prize awarded for Kahnemann and Tversky's work on prospect theory, see Kahneman and Tversky, 2000), do not in reality obtain and a further attack (at the moment mostly by Nisbett, 2003) showing that those departures from rational utility behavior are not the same across cultures or across time within any one culture.   Economics may lumber on, proud of its equations, but it will have a hard time being queen again.   Its past arrogance guarantees significant long-term loss of respect now that scientific proof of the invalidity of its logical foundations has been awarded the Nobel Prize. "Behavioral" economics is the name now given to the remnants of the economics profession trying to rebuild economics on assumptions not optimized merely to make maths simple enough to publish in journals.

So there are four sources of interest in the twin of non-linearity of systems with human social psych: the practical power of finding tipping points, the expansion of human goals immediately wiping out any simplifications obtained by new knowledge, the demise of last bastions of "grand theory solutions" as economics has had its logical legs knocked out from under it by Nobel prize winning research, and proof that the social psyches of people in different cultures are not the same and, more than that, are not even non-malleable. There is good reason to believe that complexity from the non-linearity of systems and from the culture-specific, malleable limits to perception and thought found in social psychology, will be with us for eons.

The global economic disaster of 2008, 2009 ushered in by the "best" colleges of the world in the form of an MBA sub-culture ("sub" in every sense of that word) that wiped out the global financial system and repute of laisez faire capitalism, is a clear demonstration that complexity becomes a hiding place for evil men and their greeds.   It is a PR tool for hiding private profligate interests who steal from public supports and sources. Entire civilizations may die, manifest their self-limiting nature, by becoming too complex for *any* policy to make an impact. They may simply absorb all interventions without changing much. Both of these ideas--MBAs driving the world into disaster and Western civilization self destructing--illustrate the practical import of what this paper discusses--sources of complexity and a possible way to handle them by globalizing bodies of knowledge in 36 ways presented below.

Research into the Origins of Complexity Revealing Its Destiny

Bak's Nobel work on self-organized criticality in systems (Bak, 1996), Mandelbrot's work on the fractality of patterns in nature (Mandelbrot, 1977), Kaufmann's work on self-organized criticality in gene systems (Kauffman, 2000), Wolfram's work on simple program models of time, space, and everything else (Wolfram, 2002), Brian Author's

work on the economics of first mover advantage (Arthur, 1994), niches from product niches, and take-off phenomena in markets, among many others, have been lumped together and called "complexity theory", by popular science writers like Waldrop and Goodwin (Goodwin, 1994), and others, often bringing in the work of the Santa Fe Institute, a post-graduate school dedicated to finding the origins and destiny of increasing system complexity in the universe. Wolfram suggests (Wolfram, 2002) that his principle of General Computational Equivalence, means that as many as, perhaps, 30 of his 255 elementary one-dimensional cellular automata are universal computation devices capable of emulating any computation by any brain or machine computer, hence, much of nature is based on them, producing the patterns they produce, including human brains. Hence, our brains are not more computationally sophisticated than many systems in nature, assuring us that we will perpetually find systems we are unable to build predictive models of.

The origins of complexity, then, may indicate that further knowledge development does not answer questions so much as find exactly which questions we will perpetually be unable to answer, regardless of how we bio-engineer bigger or better brains in the future. A lot of early 21st century science writing has borrowed from the above research two terms, "emergence" and "self organizing" and entirely without discipline, sprinkled them everywhere in articles of dubious organization and intent. I have no desire to get sucked into a similar display of lack of mental discipline in this paper (especially since my library--I being tricked by editors--contains not a few such tomes).

The Purpose of This Research

This paper builds a model of sources of complexity and traditional ways of handling it. It then examines the history of one elaborate way of handling all the sorts of complexity in that model that worked well--successive globalizations of one body of knowledge--to see if a generalized form of them can be developed in this paper that could be usefully applied to other bodies of knowledge to enable them to handle well the same sorts of complexity. That model that worked well was successive globalizations of quality knowledge, starting with "total"izing quality, as found in a 30 year history of the "total" quality movement. Could abstract versions of those globalizations of quality knowledge, abstracting out anything quality-specific, be applied to other bodies

of knowledge, enabling them to handle the same sources of complexity well? That is the research question that this paper explores. The product this paper produces is the abstracted model of successive globalizations of a body of knowledge that could be thusly applied to other bodies of knowledge.

Passive (Personal) Sources of Complexity--Reducing Self Scope in the face of Expanding Situation Scope

One of the major types of source of complexity has always been the way humanity as a whole splits into parts, professions, classes, cultures and the like. By making each human more partial, less representative of the whole of humanity, over eons, "progress" in history keeps forcing complexity-handling crises onto civilization. The list below is suggestive without being complete.

Specialization--Complexity from People, Knowledge, and Tools Narrower than Problems and Opportunities Are
(Giddens, 1991; Giddens and Turner, 1987; Hechter & Horne, 2003)

Herbert Simon emphasized how each new knowledge "niche" produces more new knowledge niche possibilities than earlier ones, so possible new knowledge expands more and more rapidly as total knowledge known increases (Simon, 1967). Anyone going to an academic conference the past 30 years has experienced this. The first conferences in artificial intelligence that I attended 30 years ago, were populated by people who delved into, read in, presented in all parts of the field. Current such conferences are subdivided into dozens of narrow subfields and no one knows many of them. Few are conversant with more than a few such subfields. The number of people able to competently present in, say, 10% of these subfields is vanishingly small. The knowledge of professional people, of all sorts, is an ever smaller fraction of their own overall fields. People in the same field, more and more, cannot communicate with and understand each other.

This is itself enough to increase complexity--if we learn a lot every day as individuals, our personal rate of learning is still slow enough that we known every day a smaller and smaller fraction of what is important out there to learn. There is another source of complexity in this phenomenon, however. There are no subfields dedicated to combining, ranking, fusing, splitting, manipulating other subfields. To be sure some combining, ranking, fusing, and the

like goes on all the time, informally and sometimes formally, generating new subfields, but my point is there are no subfields dedicated to this.   As a result, problems more and more appear between fields, owned by no one.   Indeed, from policy perspectives our most intractable problems, all, appear from the gaps between fields and subfields,

- individual human rates of learning are smaller and smaller fractions of the overall growth rate of knowledge
- what individuals know and aim to know is narrower and narrower exponentially increasing problems between fields having no owner.

Descartization---Complexity from People, Knowledge, and Tools Entirely Conceptual when Problems and Opportunities Are Emotive

(Miller, 2001; Green, 1986; Weber, 1986; Tarnas, 1991)

Le Carre, the famous spy novelist of the previous century, somewhat jokingly compared US and British foreign policy responses to crises--the US sent dozens of operatives with helicopters and equipment, the British, he said, sent "one good man".   This rather romantically captures my point here--that individual people and organizations more and more respond to situations cognitively depending on rational ideas to solve things, not depending on full people to solve them.   This is so much the case that any attempt to exercise one's full humanity in any meaningful social role is likely to be a fireable offense.   Full people are "unprofessional" in modern work roles and negatively sanctioned.

This creates complexity by reducing the dimensions of being human allowed into open exercise in social roles.   If you have to solve everything with only one part of humanity, you have one hand tied behind your back, so to speak. Descartes said "I think therefore I am", Plato said eternal ideas and forms are discovered by humanity, Hegel saw "spirit" unfolding itself in history--in myriad ways the West has fled body and into mind till today breasts are more dangerous on television than serial killings and mass slaughter.   Emotion and body, omitted, denied, fled, feared, avoided, do not go away--they stay around causing things that we try to solve by ignoring them, using only cognitive idea tools and approaches.

Technicization--Complexity from Tools Being Relied on More Than the People Who Use Them

(Ellul, 1990; Burris, 1993; Fogg, 2003)

A fascination with technologies and tools infests the modern world, leading to short circuited thinking. We respond to situations with technical solutions. New software tools that help programmers handle problems caused by the complexity of software tools they face and use daily, is but one humorous example of how we deepen our problems by choosing as tools for handling the same tools causing those problems. The problem is software-tool caused complexity and the proposed solution is another software tool. This drive to let favored tools respond instead of entire people insures that more and more such tools get applied more and more ineffectively, driving us to invent and deploy more such ineffective tools. US government foreign policy early in the 21st century seems to be driven by having the world's biggest military tool and hence, a lot of "interest group" interest in finding uses of that tool.   If a tool exists, especially one associated with lots of money, there will be a drive to use it.   Of course, military solutions tend to create problems also needing military solutions till everyone is in permanent war with everyone else.

Sequestration--Complexity from Social Hiding Away of Problematic Types of People and Situations

(Giddens, 1991; Bohman, 1991; Fiske and Shweder, 1986; Eisenstadt, 1986)

Sociologists have noticed how criminals, mentally ill people, children, the elderly, and other "problematic" types of people get put away in special institutions where they do not meet each other and do not interact much with "unproblematic" people. With every type of person in society who needs any specific type of care hidden away where most people do not encounter them in daily life, policy develops that ignores them and those unproblematic remaining people not hidden away develop an image of "life not needing care" that accelerates their personal transition into problematic types that need such care.   The irony of this is not lost on sociologists. Complexity increases when complexity of care actually there is hidden from view and later therefore from policy making.

Commercialization of Art--Complexity from Performance Stripped from Daily Lives and Concentrated in Central Commercial Elites

(Segel, 1986; Green, 1986; Weber, 1986; Miller, 2001)

One of the most striking components of any tribal, primitive, or ancient culture is the participation of every member of the community in some sort of annual festival, where they have one

or more performance roles, showing what they can be and do before others in their community. What make this striking is the complete absence of such roles in modern community. There performance has been commercialized, centralized, made elite so that a few super-rich people in major city centers "broad" cast their personal performances to millions of sitting people, whose daily lives are stripped of any performance.

The repetitious daily stuff called, euphemistically "news", is filled with kids, performing for weeks or months or years in video game worlds, then taking those behaviors one day into a high school, leaving people dead. Lives utterly stripped of chances to perform before younger and older entire communities of people will find last ditch suicidal ways and places to perform. Unexpectedness, hence complexity, increases when emotions and needs erupt unpredictably and in non-constructive intensities.

Self Built Identity (self reflection workload)--Complexity from Inadequate Inherited Roles and Feelings so Identities Must Continually Be Self Built

(Arthur and Rousseau, 1996; Eikleberry, 1999; Young and Collin, 1992; Suleiman, 1996; Warr, 2002; Hirschhorn, 1988; Giddens, 1991)

We used to inherit roles, social class, destiny, and lots of other things from our parents and communities of birth. There used to be both few options and little demand for options. Modernity with its transport, broadcasts, invasion of local communities by global products, and concentration of people in cities, invents roles, needs, capabilities not there before. These attract people out of inherited roles, classes, and destinies. The result, however, is lots of options, like East Germans freed one year to enter West German grocery stores. Each option invites a person to define him or her self. The result of that, however, is people face, daily, the need to be aware of and make their own identity.

It is vastly more complex when you define yourself in dozens of daily choices that no one ever faced before, than when you inherit roles from your parents and community and carry them out more or less as they did before you. Without precedent, evaluating any one new role you or others play, is laborious, fraught with interpretive work and ambiguity. The mental load alone can be overwhelming. Russian immigrants moved to Long Island, New York complained of "tiredness" from going to grocery stores and facing dozens of

competing brands for every product type, something they lacked in the Soviet Union.

Value Relativism (Liberty without Freedom, authority)--Complexity from No Criteria Above All Viewpoints Ordering the Viewpoints

(Smith and Bond, 1999; Berry et al, 1992; Nisbett, 2003; Scollon, 1995; Shweder, 1991; Giddens, 1991; Cilliers, 1999; Roehner and Syme, 2002)

When college students go to college, the first thing that overwhelms them is the volume of reading that is expected of them. The second thing is the diversity of views and viewpoints there. Everyone there is sure they are right yet nearly everyone there has opinions different from everyone else there. The contradiction of everyone thinking they are right and everyone believing something different than everyone else is so powerful it destroys childish confidence in unexamined personal inherited views and viewpoints. Most college sophomores, despairing of ever "being right", fall into relativism "all opinions have some truth to them". Relativism is despair over human diversity.

When there is no one "rightest" or "most authoritative" viewpoint to rank order and prioritize all other viewpoints, people despair into relativism. When all views and viewpoints are treated with equal respect even though some viewpoints lead to murder and others lead to civilizational decline, people despair. When, in a nostalgia for authority, people resurrect some past book or belief and worship its as best even in the complete absence of any evidence supporting that belief, people despair into fundamentalism. Relativism is despair, political correctness is a form of despair, and fundamentalism is a nostalgic form of despair. People work hard to liberate themselves from rigid, out-dated belief systems, only to suffer greatly when no authorities are automatic and no beliefs have easy priority. The work of thinking one's way through in a world without automatically authoritative viewpoints is great and a heavy burden. Complexity increases when no overall viewpoint automatically organizes all other viewpoints and complexity increases more when people flee in despair from facing this and become politically correct or fundamentalist. Pretending that one view is rightest and pretending that all views are equal are both despairing flights from the workload of thinking things through in a world without easy automatic answers. They are both simply forms of mental laziness, flights from complexity.

Demystification--Complexity from Seeing All Human Civilizational Contents as Disguises for Sneaky Power Plays--"Chip on the Shoulder" Social Theory, Liberty without Freedom

(Leitch, 1983; Edeline et al, 1970; Mueller-Vollmer, 1985; Culler, 1982; Reiss, 1982; Lodge, 1979; Lodge, 1981; Selden, 1989; Blonsky, 1985; Shapiro and Sica, 1984; Lentricchia, 1980; Greimas, 1987; Iser, 1993)

As we grow up we learn things we are not aware we are learning. This is called socialization and it is a normal part of all societies.   Children learn never to consider or imagine options never presented to them by the parents, era, community, schools, nationalities, genders they grow up in.   Later in life we discover that there were alternatives, lots of alternatives, never discussed or presented to us, and we feel cheated.   We were told the world is "this and that" and most of the interesting alternatives in life were not included in that description we unconsciously imbibed while growing up. This is not a vague phenomena but it has terrific consequences. An eye doctor, when asked why our left eye clouded up in blindness last week, gives us medicine but talks about his summer vacation whenever we ask about why.   Sure enough our right eye clouds up this week and the physician has more money from us and insurance.   Bitterly we learn, at some cost to our eye's health, that doctors are often more interested in their own money than in our health.   All that talk from our mother about the role of physicians being helping us with our health seems at such moments a momentous lie. Some of the more sensitive people among us are so disappointed at discovering this that they develop a chip on their shoulder--all truths are big lies, to them.   This takes the form of intellectuals demystifying all forms of power.   Power everywhere it is exercised is evil, they say.   All power hides secret selfish evil intents, they say. Rationality, sex, church, love, literature, celebration, wine, and more is a disguise for secret hidden evil purposes, they say.   All good and effective phenomena are disguises, they say.   Complexity increases when this attitude escapes from intellectuals frustrated by lives entirely spent in academia without practical impact and spreads among ordinary people.   For everything in civilization and personal life that gets built, established, renovated, and improved requires exercise of power.   To condemn power in toto, is to wish everyone into academia.   To suspect everyone exercising power is to cripple civilization itself. People confused about whether they should develop and exercise power act too little too late, letting small problems grow gigantic.

Mass Technology Systems--Complexity from Wider Exposure to Diversity from Mass Standard Uniform Systems

(Toffler, 1988; Giddens and Turner, 1987; Enteman, 1993; Zeldin, 1994; Braudel, 1986; Ellul, 1990; Burris, 1993; Fogg, 2003)

Uniformity increases exposure to diversity. Modernization brought railroads, airplanes, internets, cellular technologies, mass produced products--all distributed world wide.   The result is invasion of village India by images, songs, foods, and technologies that also invade Moscow suburbs and New York neighborhoods.   Sociologists have also noticed, however, how, gradually, aspects or products of that village in India participate in this invasion, going to Moscow and New York.   In other words, mass industry, mass transport, and mass society bring all parts of the world into contact with each other, not theoretically, but practically.   The possibilities of life, the options people face, expand with new options added by each part of the world. Mass systems expand diversity and complexity. They expand choice and intensify relativity of values.

Marketization of Value--Complexity from Value Depending on What Others Bid

(Evolution of Human Relations from Sharing to Ranking to Reciprocating to Market Competition on Price)--(Zelinsky, 1998; Arthur and Rousseau, 1996; Roehner and Syme, 2002; Rothschild, 2001; Applebaum, 1992; Giddens, 1991)

The word "sophisticated" in Japanese-English dictionaries tends to be defined as "sneaky". These dictionaries are using the meaning that the word had 100 years ago, when mostly country populations viewed city people as sneaky, that is, sophisticated. The word's meaning has changed and now refers appreciatively to the fluency in style, taste, livelihood, and mental acuity that living amid the diversity of a modern cosmopolis engenders.   One reason that country people distrusted city people was things that had inherent value to country people were exchanged for a price by city people.   Sex, sacred to country people, was bought and sold by city people. Land that was sacred to country people, was bought and sold by city people. Human relationships, sacred to country people, were made and broken as needed by city people.   The invasion of shared values by exchanged values horrified country people and threatened their unthinking belief that their fathers' beliefs were enough for all people over all time to live by. Complexity increases when values that cannot be exchanged, in part by being relativized, become capable of being exchanged for other values. Options increase under this arrangement.

Under-development (set up infrastructures, near future, population of competitors)--Complexity from Unreliable Near Future

(Harrison and Huntington, 2000; Arthur, 1994; Citrin and Smith, 2003)

Economic development does at first tend to decrease certain forms of complexity. Researchers have found that establishing a reliable near future is one of the primary requirements of any economy that wants to grow and modernize. When laws change at whim, or crime abounds, people cannot invest. The future lacks enough predictability of outcome. When no one invests, not surprisingly, economic take-off does not occur. Individual people need to be reliable in certain ways, laws and institutions need to be reliable in certain ways, the near future needs to be dependable. Thus economic take off requires lack of certain types of complexity.

However, when economies have enough reliability of their near futures to take-off, complexity of other sorts rapidly increases. Each product and service, generated, combines with some of all previous ones, to form new ones, leading to exponential increase in the actual possible one step of invention removed from current arrangements. This is the familiar niches from niches aspect to non-linear growth phenomena in general, dealt with in the major section below this.

Futurization--Complexity from Living in Visions, Not Seeing and Dealing with Present Actuals

(Giddens, 1991; Miller, 2001; Munck, 2000; Israel, 2001; Braudel, 1986; Weber, 1976)

As identity becomes more self designed, built from daily new options and choices made, people tend more and more to live in their imagination rather than in their present actual. They live in what is coming, from others and from themselves. They can live in the the future so much and so habitually and so well that they lose sight of the present, tolerating awful conditions because the present is not the main show in their lives. Subcultures of particular national cultures, including corporate cultures, as well as entire national cultures, live this way. Living in the future to the extent that it occludes viewing the present, increases complexity because real causes and needs appear only in the real present. When real causes and conditions are missed, they operate without observation and influence.

Ideological Selfishness--Complexity from Semi-Magical Dependency on Invisible Hands Theories that Make Selfishness Automatically Good or Alright (wealth as a measure of worth)--

(Johnson, 1995; Bailey, 1996; Agazzi and Montecucco, 2002; Strogatz, 2003; Axelrod and Cohen, 1999; Holland, 1998; Cowan et al, 1994; Schelling, 1978; Strevens, 2003; Weber, 1976; Cilliers, 1999)

Attending most classes of most top graduate schools of business exposes an ideology embedded in both those institutions and the MBAs newly minted yearly there. It is an ideology of abstraction--viewing investments and revenue streams from those investments. It is a mirror of economic theory based on optimizing economic value. When East Asian nations buy ever more risky US government bonds to keep their currency values low so they can export more to the US than the US exports to them--they are pursuing not optimal economic value from their investments but optimal social value of fully employing their populations. Economists, decade after decade, viewing this, insist it is not sustainable, their theory tells them. However, their theory sees actors maximizing economic not social values, so their conclusions are irrational. A few more decades of "unsustainable" US trade deficits and "unsustainable" Japanese and Chinese trade surpluses should suffice to bring this home even to ideologically rigid economists and business school professors. The same rigidity of thought that undermines theory in economists undermines performance of businesses managed by MBAs. Again and again economic optima get achieved at unmeasured cost in social suboptima.

Indeed, economics was the first social science to mis-use and mis-generalize the idea of "emergence". Adam Smith's guarantee that selfishness automatically produces growth, and wealth, via "invisible hands", gets repeated by generations of professors and students with remarkably little in the way of actual demonstration. The few computer simulations that have attempted it, found myriad "general equilibrium theory" equilibria, and no way to actually predict with one a particular economy would choose (when any sort of realistic assumptions about human choice behavior were input). Mandeville's *Fable of the Bees* marveled at the appearance on a large scale of goods from the appearance on a small scale of bads and vice versa. Adam Smith and Mandeville did not work out exactly how this happens the way Schelling did hundreds of years later (Schelling, 1978). Schelling's

work made clear that local scale selfishness was not able to achieve global scale generosity without lots of particular intervening conditions, unlikely to be obtained by chance.   It was by discounting myriad positive social forces, values, traditions, and behavior patterns that Adam Smith's and Mandeville's invisible hands could be seen as magically turning bads into goods.   Without myriad attendant conditions the invisible hand worked harm.   So much of economics is this way--promises of easy good disappearing once actual full accounting for needed conditions appears.   Complexity increases when invisible hand ideologies keep people from looking for or cause them to forbid discussing forces needed to make invisible hand magical turning of selfishnesses into generosities appear.   The attendant forces are not looked for or, found, not talked about and admitted.

Fundamentalism--Complexity from Fleeing Complexity into Rigid Past-like Hiding Places
(Arendt, 1971; Kotkin, 1993; Giddens, 1991)

Full flight from complexity leads one to putting some authority over all others, by magical wish, magical incantation, or other dubious wish-driven method.   It leads to letting something other than you work out what is right and wrong and how people should live.   It amounts to passing on the world of solving and getting answers to some authority or book or clique, so you yourself do not have the anxiety and mental work load of figuring out things for yourself.   Fundamentalism is the name we give to people in full flight from the diversity, complexity, and mental work load of modern living.   They run as fast as they can to the past, to some god, to some book, to someone else, to some guru, who, instead of them, has figured out everything and tells them the answers, even to situations never in the world before.   Complexity increases when you flee from reality because you do not see and deal with the actual causal forces and consequences in reality.   Fundamentalism is the counterpart to futurism--living in the past or living in the future, versus living in the actual present.

Inherent Limitations in Human Thought--Complexity from Us As a Machine Not Being More Capable than Our Situations as Machines
(March, 1988; Morgan and Henrion, 1990; Cook and Levi, 1990; Janis and Mann, 1977; Piatelli-Palmarini, 1994; Nisbett and Ross, 1980; Jervis, 1997; Gigerenzer and Selten, 2001; Myers, 2001; Arkes and Hammond, 1986; Kahneman and

Tversky, 2000; Levy, 1997; Baron, 2000; Nussbaum, 2001; Klein, 1998; Plotkin, 1993)

There are three stages of this argument.   The first is made by social psychologists, at the core of which is Kahnemann and Tversky's Nobel work on prospect theory, proving that humans do not optimize their own utility or even have the ability to know what it is.   The second is made by other social psychologists showing how such social psychological limitations of thought are not universal but change in different cultures and change over time--training can turn Japanese forms of cognition into American and vice versa.   The third is a more abstract and perhaps ultimately powerful argument by Wolfram that the simple programs underlying all phenomena in the universe, including everything we wish to understand and how our own brains operate, are computationally equivalent.   We will never be capable of thought formally more powerful than many of the phenomena we wish to predict behavior of, so there will more and more parts of reality we find we can never predict.   Complexity increases when humans are not rational as they wish to think they are, when how people think is not the same in different cultures, and when no possible genetically engineered improvement in human brain function or linking of societies of brains can make us computationally superior to many of the most important parts of reality we wish to understand and influence, predict and control.

Self Knowledge--Complexity from Being Civilizationally Unable to See Parts of Reality
(Tannen, 1990; Olson, 1962; Elliott, 2001; Ferrari and Sternberg, 1998; Ashworth, 2000; Fox, 2003; de Beauvoir, 1949; Diener and Suh, 2000)

Tannen's work on differences between male and female discourse, in the 1970s and 1980s became best-seller books, copied by major publishers in the 1990s.   Taking her research as a whole, the point it makes is, entire civilizations and societies, by slighting and downgrading the importance or even existence of female forms of discourse and cognition, severely dysfunctioned.   Add to this recent work showing how technical platforms and new technologies, widely promoted as workplace improvements worldwide are really disguises for making workplaces more feminine (Greene, 1999), and you see blind spots that take hundreds of years to become visible.   Church doctrine in Europe for 1000 years prevented the laws of motion from being discovered and used as technical bases.   Church doctrine blinded people to laws of nature, made it impossible for people to see them.   The history of such blind spots makes us rather certain that we today

operate within similar civilizational scale blindspots that will not become apparent for hundreds of years. Complexity increases when reality aspects of lost to site and influence by bias, ignorance, or civilizational scale blindness. The dynamics and forces actually operate and produce effects but, because we cannot see these dynamics and forces, the effects surprise and disrupt us, making life more complex than it otherwise would be.

Changes in Commonsense--from Mechanosense to Biosense

(Wolfram, 2002; Johnson, 1995; Bailey, 1996; Cilliers, 1999; Schelling, 1978; Giddens, 1991; Olson, Malone et al, 2001)

New generations of people live in worlds different than their parents. Parents cannot imagine what the differences of condition, the different hopes and fears of growing up, are and how they affect generations of children. The result is always two competing forms of commonsense or more operating in organizations and societies that mix age groups. In the early 21st century you could observe a shift from physics and the edge of science to biology, and with it admiration for mechanical things shifting to admiration for biologic things. Steel, admired for its strength looked vastly inferior to bone, for bone grows stronger as it is used and where it is most used, and bone repairs itself. Steel does none of these things. MIT materials scientists aspire to bone-like material inventions now, rather than steel-like ones. When commonsenses clash discussions become irrational for people are unaware of the contents of their own commonsense. All they observe is others "lacking" commonsense, meaning, lacking their particular commonsense. Add generational change to this and you get policy fights and irrationality fed by inter-generational differences of automatic valuing and assumptions of things. This increases complexity.

Active (Situational) Sources of Complexity--Expanding Situation Scope

All the above passive sources of complexity cause complexity increase by shrinking the human actor in the face of expanding situation options and contents. With each individual more partial, the same conditions facing them, overwhelm them and their capabilities easier. Each individual is a narrower and narrower look at and talent for response. It takes more individuals more complexly arranged to achieve any one overall effect. Passive increase in complexity is founded on increases in human partiality, reduction in personal scale in relation to growing situational scope. Active sources of complexity are not concerned with individuals but with the situations they face. It is impossible to cover and present comprehensively all forms of situational complexity in any paper of reasonable size so I have chosen to present immense surveys, done in previous work, here, as references to readers as they read the further arguments below. The particular models below were the most comprehensive published at the time of their first publishing.

Non-Linear Effects

(Hardin, 1985; Jervis, 1997; Sornette, 2003; Casti, 1991; Casti, 1997; Cowna, 1994; Andersson et al, 1997; Kauffman, 2000; Kauffman, 1995; Johnson, 1995; Kelly, 1994; Kenrick, 2001; Schellling, 1978; Svyantek, 2000; Vallacher and Nowak, 1994; Watts, 1999; Yates, 1987)

There are three reasons that life and work are becoming more and more non-linear. First, humans via personal computing no longer need to use linear models of reality because handling non-linear math is costly. Non-linear math has been made no longer an obstacle due to the spread of personal computing. Therefore, our pretenses in models that reality was non-linear have dropped away. We now openly admit and address the non-linearity that was always there in most situations. Second, situations that were not non-linear have become non-linear. Mass-issifica-tion of products, transport, communication--has increased options and inter-actions through global and national economies, polities, and cultures. Thirdly, new situations have appeared that are non-linear. Venture business districts, copying Silicon Valley, have spread worldwide with specific institutional arrangements for lubricating exchange of ideas, personnel, technologies, and services among firms. Non-linear actions there have strongly non-linear consequences. Below I present a large model (the largest yet published) of distinct non-linear "surprise" phenomena from over 20 different fields. A book describing each with method for handling them exists (Greene, Management of Non-Linearity, 2004). In this paper, the point I wish to make with the diagram below is this--that non-linearity constitutes most of the parts of the world we have problems with. Indeed, languages have sayings from hundreds and thousands of years ago. Most such sayings directly describe or name non-linear phenomena from the charts below (example, "a stitch in time saves nine", "let sleeping dogs lie", etc.). Non-linearity has a long lineage in human history.

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Attention Distraction Effects			
Time Blind	effect omission	unplanned second order effects	people plan and intend wanted outcomes not envisioning responses of myriad involved system elements/forces/persons
		ownerless problems	problems without obvious owner, beyond simple profession boundaries often too unfocused for any one group to handle
		emergents from interactions	totally unplanned outcomes often emerge from the myriad parts of systems interacting as a result of 1 or several moves/initiatives
		partial solution lowers standards	partial successes often change people's ambitions or criteria of success lower, so accept transient solution that go away
	counter effect	side-effects counteract main one	many side-effects directly counter the main intended effect, undoing it, or distracting from it via huge costs worse than want
		act combines counter intent	the actions done to reach a goal though individually toward goal combine to counter the goal
		staff combines counter intent	the people working to reach goal though individually helping reach it combine to prevent it happening
		launch manner counters intent	the manner a solution is launched with counters overall intent
	result surprise	self-reinforcing growth self limits	an act can have result that cause more such results continually till negative feedback self limit process grows big and reverses
		moderate solution bad so miss good larger one	when initial small solution tries fail badly, people give up and miss fact that much larger such tries would work well
		side-effects of result worse than benefits of result	the side-effects may be much worse than the benefits of getting the intended main effects
		result done is not satisfying/wanted	some intended results when actually attained and experienced do not satisfy
	time surprise	similar input very different outputs	similar inputs, even extremely similar ones, can produce extremely different output types in any non-linear system
		usual input whole system changes	an input just like usual ones done many times already can yet produce entirely different never seen before results
		fast good results then huge bad ones	early or easy initial results can be good lulling people till huge bad ones suddenly emerge from unseen negative feedback force
		solution with delayed huge cost	good solutions can work well in many respects till people notice huge negative costs that are delayed often considerably
Space Blind	cause allocation	cause at problem locale only is attacked	people can completely handle causes acting near where problem appears and thereby miss many other bigger causes acting in far flung other parts of the system
		cause of other causes not attacked	many causes can be handled well but since what causes them is left untouched problem reappears continually, especially when one cause after another is handled
		system caused variation "solved" w/o system changes	when design or configuration of the system causes some problem, solutions that miss it will allow the problem to reappear
		big environment caused failure blamed on weak/1 component	environment or whole system design caused failure gets blamed on one component or weak one, letting problem reappear
	environment allocation	other part as envt undoes 1 part fn	functions of one system part can be undone or blocked or made harmful by functions of other parts acting as environment of it
		lack of leeway in other parts stifles 1 part's function	each part doing its own function very well can cause overall failure because they do not have leeway helping each other do their individual functions well
		environment changes during solving	the solving process can take enough time that the environment around it changes so as to undo its effects
		solution so particular to 1 environment cannot be used	a solution can be so particular to 1 environment that it cannot be used or its effects are transient as the environment evolves
	support allocation	credit & rewards not to those who solved	systems can reward people who did not actually solve so in the future they do not solve things
		outside help used till own capability atrophies	outside help can assist you so long and well that your ability to live without it atrophies causing disaster when it is no longer available
		great solution for situation too weak to last	great solutions can be too weak to last and keep problems at bay
		great solution gets enemies cuz of who supports it	great solution can assemble and motivate scattered ones who dislike it or who does it or fame from the doing of it
	order allocation	enough chaos: local act effect goes unnoticed	enough chaos can prevail that good effects go unnoticed and unappreciated
		enough order: local act cannot affect system	tight interconnections in a system can make for such stasis that nothing can change enough to constitute solution of problems
		sequence of solving exacerbate user dissatisfactn	the particular sequence of acts in a solution process can create user dissatisfaction that overwhelms their overall result
		solution delivery configuration harms	how a solution is delivered can undo any of its benefits

Reaction Blind	others' response	overfishing	people getting less than needed can try harder, getting even less, so trying harder till no common resource is left
		rich get richer	those with slight initial resource advantages can be so favored with results that their advantages grow hugely
		price war	several parties can undermine their competitors' prices, till everyone together goes broke
		envy isolate	successes can produce such envy caused isolation that benefits are unusable
	customer response	when get what want, dislike it	people can find negatives of losing goal to achieve outweigh attaining concrete goals
		when live with result, hate it	people can find that experienced result dissatisfies them
		solving process raises expectations so hate result	solving process can raise expectations to than any likely result dissatisfies
		representative of customer's spec are wrong	how we represent what the customer requires can distort or miss actual customer requirements or miss customer changes
	response to production	producers become/supplant customers	the requirements of producers can supplant needs of customers in projects so customer hate the result
		during production parts/requirements change	while producing something enough time elapses that components or overall requirements change
		parts hijacked during production	parts during a project get noticed by others and taken for other purposes
		way something produced kills interest	the way something is done can undermine the purpose behind it
	response to professionals	factors from unincluded profession, kill	professions omitted from an effort usually have been omitted because they have vital but unpopular knowledge needed by it
		profession not customers make requirements	producers of a project or designers of it may supplant requirements of customer of it with their own requirements
		inter-profession disagreement on basics	the plural diverse professions required by a project may be unable to agree on even the most basic aspects of it
		solution more complex than problem	solutions may dwarf in complexity the problems they are to solve
Scale Blind	attitudes	fatalist and hermit	the world cannot be trusted, withdraw and minimize harm--this attitude makes the world horrid so withdrawal is needed
		egalitarian	the world is dangerous and untrustable, we have only each other, so stick together above all--this drives merit away
		individualist	small errors and big errors have mild consequences, the world is trustable so anything goes--this eventually produce disasters
		hierarchist	parts of the world are very dangerous, parts okay, must know boundaries--this eventually produces dated distinctions
	scales	components too big	the scale of problem/causal elements differs from the scale of solution elements
		components too small	the scale of problem/causal elements differs from the scale of solution elements
		overkill solutions or cut vital stuff as waste	the scale of problem/causal elements differs from the scale of solution elements
		overly incremental solutions	solution too incremental may allow drastic changes of situation during long implementation periods
	flexibility	solution perfect for present situation only	solutions may be so specialized around current situation that slight changes of environment vitiate them
		parts config lost in responding so problems reappear	inter-relations needed among solution components may be lost during the chaos of implementation so problems reappear
		new parts added rather than reconfigure old ones	situations tend to get solved by adding things rather than replacing present things so complexity builds and dissipates efforts
		culture of designers narrower than culture of customers	the culture of designers/solvers may be so much narrower than that of customers of a system that requirements of customers get missed or distorted terribly making outcomes unfit
	diversity	social ranks block feedback flows	social status and merit rankings can be boundaries across which feedbacks do not flow so leaders miss results of their own acts
		firms or department functions block feedback flows	functional departments of sets of firms may block the flow of feedback so leaders miss results of their own acts
		single solver pushed to heroics because alone	solvers acting alone may be driven to extreme heroic level efforts that, lacking subtlety and patience, ruin solutions
		committee forced unneeded diversity	committees doing solutions may force forms of diversity on a project that disintegrate it and make it unwieldy

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			Ineffective Organization System Handling	
Undependability	attempt home runs	long cycle times allow time for many errors	long cycle times for doing things allow time for many errors to accumulate	
		giant greenfield initiatives that don't build on past	totally new goals and means in a project fail to link to already built up and tested capabilities, making achievements unstable	
		career system rewards distinguishing self from others not building on their work	career systems can end up rewarding flashy launches of new initiatives not patient solid doing of hard long things, so rewards can reduce building on work of others or cooperating	
		aggressive specs that ignore real capabilities	leaders can force extreme specs utterly unconnected with actual people and process capabilities	
	unknown requirements	long cycle times allow many outside market changes	long cycle times in a project give time for outside environment, customer, and market changes to undermine what is done	
		many changes of requirements	requirements that specify what a project does can continually change during doing of the project making designs chaotic	
		marketers "know" customers but don't and don't see engineers as their customers	marketers can substitute own bias for what customers really want and can impose not effectively communicate requirements to engineers	
		one-product projects when all know competition will instantly respond	major one outcome efforts can demoralize entire workforces who know competitors will instantly respond to any one innovation actually done	
	unknown capabilities	long cycle times allow many changes of personnel	long cycle times for a project allow time for key staff to change, retire, or lose interest reducing skill and quality	
		one old generation manages so younger imaginations shut out except crises	stable fixed old leadership generations controlling all shut out, always without exception, younger imaginations or force re-interpretation mistakes onto projects till failure results	
		unfunded capability development so must invent product and technology together	product development gets funded but not development of reliable new technology such products use so projects jointly develop both, making performance achieved unreliable	
		early phases understaffed/funded; unrealistic schedules from remote leaders	old projects always late so early phases of new projects are understaffed, causing errors to be spotted/fixed expensively later in projects; remote leaders force unrealistic schedules	
	tradition of quitting	products/projects often cancelled	tradition of leaders suddenly cancelling projects cause entire workforces to underinvest in projects till nearly completed	
		no manager action till problems are huge	hierarchies can cause local problems to get unresolved locally, instead escalating to VP level, delaying solutions	
		resources adequate only at product end	managers can fear early resource flows, hold back resources, so errors build up expensively treated at project end	
		subsystem team arguments escalate cuz refuse trade-offs	subsystem teams may refuse trade-offs among each other, hence, escalate arguments to VP level, delaying solutions	
Separation	missing coordination	team members not co-located; global suppliers jerked around without context	teams split geographically can result in "in" groups jerking other around suddenly without context, warning, or consideration of local conditions and capabilities	
		unprincipled management causes waits for many sign offs	hierarchies can impose levels of permissions which only serve to delay key actions through projects dangerously	
		travel, waiting, reporting are most of development work time	the logistics of communicating and documenting a project can become half or more of all work, supplanting real design	
		reviews distort actual capabilities	leader reviews can be unprofessional due to remote leaders or delusional due to leader political distortions of reality	
	faked solutions	no incentives for needed behaviors: building reliable technology	all the incentives in a project can favor errorlessly and quickly doing things impossible to due errorlessly and quickly without development of technique/technology base that is unfunded	
		leaders remote and ignorant, do not like nuts and bolts solving	Western leaders want social class superiority to workers hence do not get hands dirty, lose sense of real capability, become totally dependent on politics distorted reports	
		waiting till problems huge then killing entire project preferred as it spreads blame	leaders prefer to let problems grow so huge that they kill entire projects as that spreads blame beyond one leader; smaller problems can be blamed on one leader so dangerous	
		no personal, social, knowledge basis for inter-manager agreement, so solution is political	managers so competitive that no rational negotiated solitons are possible among them, instead only political agreements are possible making technically irrational solutions	
	faked solutions	managers lack the social skills to guide without punitiveness	managers may lack the social skills to work with or encourage own employees, instead, such managers are hated whenever they are around others, acting punitively among them	
		managers force symptom only solving by tacit intimidation	managers unwilling to imagine or solve deep issues or political ones, may force solving of only superficial aspects by intimidating people	
		promotions not based on actual problems faced and solved	leaders may be recognized and promoted based on things other than actual problems faced and solved so incompetent contexts in higher leaders judge/distort lower competent ones	
		no consensus building process on product strategies	overall product strategies of a group may be contested and not agreed on so individual projects do not add up or synergize	
	learning-lessness	no building on success/failure of previous teams	leaders to show own worth may deny worth and value built up by predecessor managers, ignoring previous team learnings	
		missing project postmortems	leaders may ignore reviews of completed projects to find learnings as they do not intend to apply past learning in future	
		tradition of hiding slack time and no one covering for others on team; no pain sharing system	project aspects that cause one role to work harder than others not recognized and equalized so people hide slack and other private benefits that compensate them for unfair work loads	
		creativity valued over effectiveness	creative solutions that bring visibility may be preferred to humdrum but cheap reliable ones that work better	

Person as Bureaucrat	consultation solving	consulting = participating	leaders can consult genba for genba's reactions then ignore them and consider that a participatory system
		roles assigned by precedent not need	leaders can structure all present projects just as past ones were ignoring unique needs and opportunities of the present
		social will not mind used to solve	getting everyone to fail together is worth as much as getting everyone to succeed--togetherness considered solution
		rotating everyone before an issue	rotating all leaders before an issue is considered adequate even if not consensus or insight occurs and leaders sleep
	social solving	ignore = solve	ignoring a problem for generations is as good as solving it, the Charlie Brown strategy, ignore it till it goes away
		admit issue = create issue	admitting you have a problem is the same as creating the problem--this attitude
		agreement all interpret different is agreement	consensing on a vaguely worded agreement that everyone interprets completely differently considered agreement
		agreement fact outweighs content	social fact of agreement being announced more important than whether anyone really agrees with anyone else
	hiding in uniformity	intolerance of slight differences	slight differences of one group to another, one project to another, hated and resisted, forcing all into same mold
		information hiding	hiding information and problems is as good as actual solving--this attitude
		if new, not an issue, only old issues are issues	new issues are not really issues, only issues that have been seen before are treated as issues
		copying rivals outweighs inventing solutions	copying competitor moves is considered more important than inventing own solutions
	issue irrelevance	issues are just distraction from real work	issues are considered distractions of real work of doing past routines without thinking
		good managing = issuelessness	good leading is considered leading that avoids any issues and deals with no issues
		changes in environment interpreted as already found inside group	environment changes are all assimilated to inside of group already known phenomenon--so nothing is ever really new, that is, nothing requires new thought or effort
		considering whether to do so thorough it = doing	consideration processes are so thorough and long and detailed that they are more complicated than actually doing what is considered
Mindlessness	issue buying	issue generators neutralized coopted early	any social unit that might generate issues is coopted by payouts early, that is, paid to not generate issues
		attitude discrepancies responded to as issues	differences of attitude are considered issues so opponent positions are constantly folded into own position, remove ing debate
		long standing irrational situation is natural = not issue	long standing unfair or irrational situations are, because long around, considered non-issue, and never improved
		pay money to all parties = solving	instead of hard choosing and thought, just pay all parties money to make issues go away
	appearance is reality	ritual process repetition is work, not issue handling	following social rituals of consideration considered how to handle issues even if solutions not invented or tried
		cost of issues is lost focus on unity of group	issues considered harmful because they distract people from the mystic unity of the group and society
		social surface: establishing a thing called a solution = solving	getting everyone to call something, anything, a solution is considered a way to solve issues, regardless of whether it really works or changes arrangements in society
		super direct solutions, bypassing causes	getting people to like bad situations is considered good solution, better than removing bad situations
	faked interactions	easy meeting tradition: discuss = repeat elder opinions	meetings that just ritually endorse opinions of whoever is oldest in the meeting, after consulting/ignoring everyone
		group wrongs better than interrupting unity with issue	wrongs perpetuated by a community are better than disrupting community by eliminating such wrong at cost of lost unity
		trance-like "no mind" state is ideal consciousness	clear minds, without issues, is a goal of governing
		mastery & automation of routines = ideal action	action is ideally the mastery and automatic repetition of old established routines, not the hectic scurrying to solve issues
	peaceful literalness	perfecting everyday life = greatness	inventing and living a perfected polished smooth everyday life personally is what society issue handling is for
		issue preventing = garbage collecting	preventing issues is the same as garbage collecting in importance
		slight disturbance of "no mind" daily life state intensely investigated	anytime and anywhere people get interested in issues is a real problem for society and must be stopped
		utter meticulousness of handling trivialities	tremendous detail and administrative power applied to trivial disturbances of clear mind No Mind consciousness

Policy Self Contradiction			
System Basics	systemness	power from position	instead of groups and individual actors by action making power, most comes from their position in systems
		behavior from location	instead of groups and individual actors by action making their behavior, most comes from their position in systems
		parts-whole differences	wholes have traits not found in any of their parts
		self conscious evolving system	systems whose parts think (consciously react) and evolve nearly never do just what is planned or intended
	creativity of systemness	complexity from simplicity	from simple local actors interacting by simple local rules, global complexity can emerge
		dangerous safety measures	safety measures increase unsafe driving habits causing more injury not more safety
		cannot do only 1 thing	humans acting in social systems can never do only 1 thing or only what is intended
		systems change element traits	the system has traits different from traits of its parts, which system traits change context of parts traits = meaning changes
	relativity from connectedness	tight linkage = fault widening	more tightly linked systems are efficient but subject to widespread failure when small faults appear
		basic units resist change	many interdependencies mean basic units resist all changes because relations to other units would also have to change
		non-consensus based existence	some system elements exist only because other elements must consense to eliminate them, consensus is hard
		relations determined relations	relations between some actors determined by relations between other actors, not between each other
	systemness effects	cats cause flowers indirectness	extreme indirectness of effects--cats eat mice which therefore cannot eat seeds, causing 1 flower type to dominate/appear
		delayed effects time fractality	hard to declare any policy/intervention a success because time period of side-effects is fractal, multiple size scale
		second best become disaster	second best conditions do not produce second best outcome in non-linear systems, but often disasters
		theoretical best = actual worst	best in theory can be terrible in practice
Unobvious Causation	perceptions as acts	context locality make meaning	context (system parts near) of actor different than act viewers so intended meaning not seen meaning
		action consistency message	our response to this instance seen as info about our response to future similar instances by others in system
		reacting to reactions	others' reaction to our actions change our preferences, acts, and self image, and reactions to their actions
		waves of fashion	parallel micro-environments and deployed changes taken up by parallel micro-environments
	non-additivity of effects	similar inputs different outputs	similar inputs can have vastly different outputs
		diminish returns critical mass	output decline after certain level of inputs; output appears after certain level of inputs
		effect from other effects	an effect's existence depends on presence of certain other effects/variables
		input increase reverses effect	ex: incentive to act morally reduces moral action; increase in input increases output for a while then suddenly decreases it
	path dependence	variable order change outcome	order in which variables act changes outcome produced; ex: baby before not after marriage
		action timing	when in process plea or proposal happens determines what outcome they produce or tend towards
		transient factor effects endure	effects of a factor that ceases to exist can yet endure far beyond lifespan of factor that created them; ex: found firm
		hysteresis: path dependence	outcome may vary on how variables attained key values; ex: water flow from open vs. closed faucet
	the blame illusion	failing variable may yet be OK	a variable change may fail to produce an outcome not because it is wrong variable but cuz other variables needed also
		gradual vs. leap to big input	gradual steps to some input value may not produce same output as single leap to same input value
		blame fails	effect of one variable depends on others so blaming one variable nearly always wrong
		bad people illusion	people bad in one team can be great in another; worth is relative to environment challenge of other personalities interacting

Environmental Acting	**futility of plan & design**	plural OKs = disaster	several slight, individually negligible, faults together can cause disastrous outcome
		futile to improve 1 part	even giant improvements in one factor can have no effect or bad effect on wanted outcome
		false polarities	nature versus nurture type arguments are false because they each are environment for each other; they are a system
		evolved over designed traits	evolved traits tend to be far superior to designed traits because invented relative to actual environments encountered
	results as environments of later actions	small steps create crisis	inadequate first measures can exacerbate a situation while drawing attention making it look worse, so crisis expands involvement
		bad people illusion	people bad in one team can be great in another; worth is relative to environment challenge of other personalities interacting
		"right" tactic illusion	European softness proved "better" than US hardness, BUT because US hardness was context, established by deeds
		enemy focus error	view 1 enemy policy, miss actual & possible others and relations among actual and possible others as the "1's" meaning
	strategy ecosystem	effectiveness erosion	professionals surprised when what works for years gradually fails BUT audience changed;ex:rank colleges but fit= worth
		reaction to others' expectations	actors react to what other actors expect; ex: A thinks X hard so Y tries it and wins cuz of A's expectations
		blinded by seeing	my clarity on my motives causes me to miss that B mistakes what my motives are, so I misinterpret wat B's motives are
		blind to origins of own strategy	I use strategy X with present opponent W because my previous opponent used strategy Y, but W is not Y
	act to create environment	phony proposing	many proposals, threats, actions are done because we know or expect other will ignore or stop them, so not genuinely meant
		actuals vs images tactics	tactics that weaken me actually can make me stronger cuz of effects of image I create; arm spending excess = strong image
		reacting to environment I create	result of my actions become environment determining further actions I take and results I aim for/achieve; over-react movts.
		interaction as environment	interaction can change aims, beliefs, capabilities of actors; conflict can harden, extremize, mobilize enemies
System Caused Helplessness	**trapped by environment own actions create**	want what denied	interactions become experiences that change our aims, so we want what is denied us more than before denial came
		greener grass on other side illusn	we imagine our self with different situation, partner but it is not same self relating thusly to different things, =not better
		repetition is not repetition	repeated inputs can produce very different outputs cuz 1st results form new environment of action;Hitler Czeck/Poland
		blame environment I created	ex: he hates me so I do it, but I provoked him to hate me, then use result to justify my initial provoking
	control illusion	self fulfilling prophesy	I fear X, defensive build up that provokes X to fear me, justifying my initial fear
		fatal solutions	plans and designs not = results; ex: oil spill clean up increases overall pollution
		control is less powerful	total control to do incenting acts less powerful that likelihood of error, that uncertainty forces cooperation
		counter effects	Titanic-safety = careless = danger, ban X = X popular = more X,
	intent not result; incentive not result	user not giver context	aid or acts given used entirely differently than planned if use context differs from what givers assumed:
		incentive gaming	following incentive leads to bad behaviors: increasing measures supplants service impact;
		target population evolves	target population of incentives change when incentives seen; ex: aid draws self supporters into dependency as easier way 3
		designed outcomes = inputs	mandated, directly imposed, outcomes are inputs guaranteeing unforeseen bad outcomes later:WWI's peace causesWW2
	systems as limits to knowledge	with X without X illusion	functional substitutes for X abound so without X cases may have X by other means not seen
		do A vs. B in case illusion	cannot find identical real cases so difference in results of A vs B from context or evolution differences not seen
		power relativity	real & imagined alternatives by us and opponents/peers determine power/fear so generally cannot determine
		motive of act indeterminate	X challenges Y because knows Y is strong or because does not know Y is strong-- cannot tell generally

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Tools for Handling System Effects Well			
Feedback Caused Ignorance	system narcissism's illusions	success illusion	getting wanted result shifts attention elsewhere, others see so result eroded:speed fees cut speedg&police=more speedg
		last method worked illusion	last in series of negotiations worked so method there is good but only worked cuz context set by earlier methods
		see what works several try illusion	cannot make several tries cuz each try changes context
		act in own interest fails	many actions directly in own interest hurt own interest cuz others reactions; repress revolt increases revolters
	misleading truth appearance in systems	unplanned results okay	people use treatments for own purposes (in own context) so unplanned results inevitable
		solutions look like failures	solutions applied at priority problem/crisis areas/times so often fail but still great value cuz context=extreme challenge
		variable fails/works illusion	variable X fails or works in some cases means nothing cuz those cases when X used are special or extreme somehow
		anticipate info effects of acts	when actors know being watched for info on future reactions, changes how act now
	indicators mislead in systems	indicator meaning indeterminate	if less of those accepted come maybe cuz we are bad or cuz bad ones don't bother applying
		single indicators cause gaming	any intelligent person can distort unmeasured variables to get indicator "high" at huge or counter costs
		solving symptoms	indicators can indicate success steps in small increments encouraging inadequate scale efforts till real causes overwhelm
		non-causal indicators	indicators not focussed on real causes or less distributed or numerous distract from needed causal work
	feedback relativities	feedback results	positive = growth, negative = stable systems, escalation = symmetric growth, appeasement = compensatory change
		feedback topologies	within individuals--feeling an emotion makes it bigger; between levels--alignment/constraint cascades
		feedback locale/scale dependent	arms races show positive feedback at ind.l actor level produces negative feedback at relationship, dyad, level
		same input plus once minus later	predator/prey cycles example; winners create envy (neg) but further wins create partnering/adoption (pos)
Types of Feedback	negative feedback	success creates failure	expansion creates fear become easier expansion becomes too much expansion till collapse
		unstable pride & depression	pride makes more trying till overextension collapse; loss makes less investment so more depression till collapse
		self limiting acts	imposed concession produces powerful negative fdbk; successful methods get copied losing their advantage
		info caused negative feedback	lock on door tells thieves where to steal from: success atrophies collaboration skills so no help in hard times= failure: using signal causes signal to end (acting on rumor ends it)
	neutral or lateral feedback	changes create changes	one change creates new issues becoming further changes; feedbacks between fdbk cycles evolve laterally
		ideologic poles shift ground	dialectic of bigoted responses automated so moves between poles are lateral shiftings of ground
		expectations inflated to zero	process of implementing design can inflate expectation till they undermine outcome satisfaction forcing new initiative
		what works undoes itself	what works gets copied till org has too little diversity to handle environment change, so success self moderating
	positive feedback	escalation by identity change	I did bad thing, so I am bad, so I might as well do more bad things: media say bank weak so it becomes weak
		escalation by public privates	if I see others actualizing what I only wish, my wish become action, causing still others to act = movement
		preparations become actuals	I fear X so prepare for it and gather tools and resource for it that appear waste, so they lobby me for actualizing X
		accelerating mutualism	integration creates niches for further types of integration
	knowledge & network economy feedbacks	increasing returns to scale	for knowledge products, increasing sales does not increase costs, so prices drop greatly increasing sales
		vaporware, success expectation	if success is expected then product succeeds so competition to look most likely to succeed
		escalation by learning costs	if better alternative requires much unlearning then it is not chosen
		lock in, rich get richer in network	first not best wins (QWERTY); becoming standard raises value greatly so greater growth becoming standard

Main	Sub	Name	Description
Undoing Non-Linearities	evolution to opposites via positive feedbacks	reform causes revolution	rulers fear small reforms will get out of hand so no reforms so revolution ensues
		reporters create news	reporters ask leaders about stories they want to cover, causing remark-news
		conquest evolves into game	first victories make second easier so later conquests are more and more nominal till conquest overall is fluff
		more cycles	violation/news/visibility/sales/wealth; greed/striving/compete/ideas/wealth; care/depend/control/helpless/care;
	reduce non-linearity	prune connections	reduce non-linearity of reaction
		cross-level observation	monitor results of actions on larger and smaller system size scales
		undo customer stand-ins in system	find requirements of functions, professions, leaders etc. substituting themselves for what customer require and undo
		self justifying effect study	people study second order effects only if and where consonant with biases and wanted results
	use emergents	steer emergents	use emergent side-effects steered to attain your goal
		tune system interactions	till wanted emergents appear; connectedness, diversity, patchings parameters
		do population of strategies at once	do multiple contradictory strategies at once, observing side-effects & results, then join emergent winners
		stop by extrema	tip into chaos to stop, tip into stasis to stop, tip into cycling to stop,
	manage side-effects	domino paradox	small losses erode image so act boldly after small losses
		move opposite to your goals	use reactions to that by others/competitors to attain your goal
		attract by rejecting	attracting by playing hard to get
		stopping continual not 1 time	blocked action produces work-arounds so continual new blockings are needed if you wish to stop some action
Get Causally Systematic	manage linkages	2 acts: for goal for side-effects	act dually, one to attain goal, one to handle side-effects of attaining goal
		act in twos	acts that appeal to A and that appeal to A's enemy
		do virtual acts for side-effects	do actions whose only purpose is eliciting side-effects which are your wanted main-effects, slough main-effects
		influence by environment	influence others by creating environments they adapt to
	form solving populations	component compliant roles	design each system component to do its role while adjusting to help adjacent "environment" parts to do their roles
		cleavage bridging	mobilize all usually ranked, separated, professioned things across borders to envision and implement solutions
		process transparency	manage processes till transparent to wants of customers they serve
		pluralize units of competition	mobilize network of diverse types of firm/org in scale with system causation of phenomena/opportunities faced
	handle systems causation	distribute probs, causes, solutions	distribute throughout entire system problematic aspects, causes of local problems, solutions to undo causes
		act against cause of causes	determine root causes generating other causes as symptoms then address the roots, distributed throughout system
		distinguish system/special causes	address variations in outcome from traits inherent in system's design from transient happenstance circumstances
		evolving wants & satisfaction	find wants unwanted when appear, solution not satisfactory when experienced, design for contexts and outcomes
	undo self contradicting solutions	undo producers become customers	producers of a project tend to supplant their needs for end users of the project's product
		parent orphan problems	investigate problems not fitting existing professions that fall between cracks
		stop evolving requirements	find projects whose customers continually change requirements during design and stabilize as staged deliverables
		counterproductive launch, staff	find way something is done undoes result or who collaborates to do it undoes result and change way/staffing

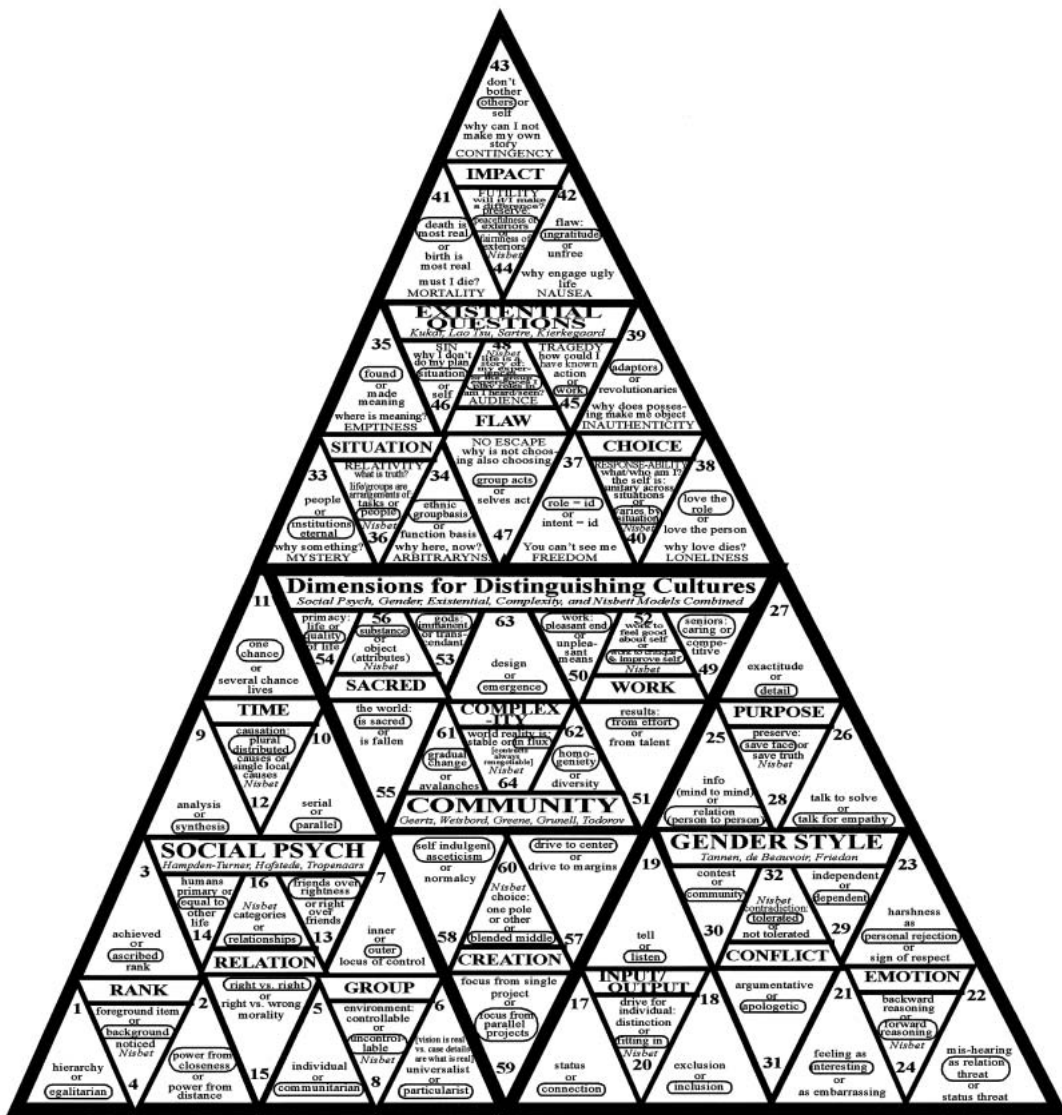R. T. Greene,   Generalized Quality

Diverse Forms of Social Diversity (Pheysey, 1993; Denbison, 1990; Trice and Beyer, 1993; Raelin, 1991; Paul et al, 1994; Bledstein, 1976; Kotkin, 1993; Berger, 1991; Tannen, 1990; Rasmussen and Rauner, 1996; Crane, 2002; Munch and Smelser, 1992; Alexander and Seidman, 1990; Smith and bond, 1999; Berry et al, 1992; Nisbett, 2003; Scollon, 1995; Shweder, 1991; Stigler et al, 1990)

Social diversity slows decisions and development of cooperation but improves quality of outputs, previous research has found.   The twin errors of relativism and authoritarianism/fundamentalism come from despair over facing diversity.   Some people give in to it, refusing to handle the mental work load it requires and other people flee from it into something unreal but simpler they can let face things for them so they do not have to do hard mental work themselves.   Geographic globalization forces people into interior reflection as they come face to face with ways of being they have never encountered before.   The journey out is a journey in, Joseph Campbell says (Campbell, 1949; 1986).   There are many diverse forms of social diversity to encounter. However, there are few published maps of this diversity.   The table below presents one previously published one.

30 Skill Dimensions for Handling Diversity (from Greene, Leveraging Diversity, 2000)

		skill	method
manage values	dimensions	recognizing plural possible **reactions** to diversity scenarios;	scenario judging
		recognizing your own **propensities** along ambiguous dimensions of response to diversity;	culture self assessment
		recognizing social, cognitive and other **dimensions** to responding to diverse situations;	skill dimensions
	strata	recognizing your own **stage of penetrating** a diverse situation/culture;	culture penetration stages
		recognizing your own **stage of personality** development;	personality development stages
		recognizing cognitive **step** sequence **in responding** to diversity;	stratified responding
	cultures	recognizing **illusions** all people have about the nature of values and cultures;	culture illusions
		recognizing the **uses** to which culture is put in business situations;	plural culture definitions
		recognizing **the other guy's way** of doing things; learning to do things the other guy's way;	learning cultures
manage self	de-socialize	undoing unconsciousness of **costs** of talents;	counter neuroses
		undoing unconscious **value commitments** made in the process of growing up (socialization);	being educated
		undoing **power given** over to outsider institutions while growing up;	de-myst, myth, constructing
	de-behave	undoing **commitment to plans** and process not outcome;	problemlessness
		undoing casual **dropping of self-reflection** in daily life;	personal quality checklist
		undoing **automaticity of response** to situations;	response stopping
	transfer & shift	undoing **ignoring** implicit culture supports and blocks to business practices;	transplanting business practices across cultures
		undoing **common bounds** and intensities of doing mundane work tasks;	being stretches
		undoing **information shifts** to diversify results rather than people shifts;	leadership shifts
manage groups	interests	balancing how **management functions are delivered** where and when and in the amount needed;	JIT managing
		balancing **costs of improvement** among people at work;	pain sharing
		balancing (and recognizing imbalances among) **dynamics** of various comprehensive models of all the diverse elements at work;	manage by balancing
	meetings	balancing **types of remarks** in meetings;	meeting behavior plotting
		balancing **causal analysis types**;	causal diversity
		balancing types of **topics**, types of **treatments** of topics, and **leaders** of treatments in meeting and work process assignments;	democratic rules of order
	events	balancing **public display** of excellent word and deed with functional appearance opportunities for employees at work;	polis
		balancing **emotional** infrastructure in support of needed transitions **with rational** requirements;	community quality cabaret
		balancing need to **specialize** with need for organizational learning and **parallel processing**;	managing by events
manage flow		scripting what you are **having feeling about**	emotion mapping
		scripting the interplay of **different frames** for viewing the same action stream	comedies of expectation
		scripting the **market principles** inherent in outrageous products/services that already sell well in some market	extreme product extrapolation

Most fundamental when facing diverse forms of social diversity is a way to characterize and therefore distinguish precisely the unwitting unconscious assumptions found there but not admitted or recognized by most people and institutions.   We all grow up learning things we are unaware we are learning so as adults, the people we encounter rarely know most of the values and attitudes and choice repertoires they operate on.   Before we can make them aware of what operates in them that they are unaware of, we have to have a way of characterizing and expressing it precisely.   Hence, facing social diversity of all forms, requires ability to model differences of culture.   Previous research developed the following 64 dimensions for distinguishing cultures, combining quite a bit of research on characterizing cultures.   In this regard it should be mentioned that sets of business practices, like just-in-time manufacturing, enterprise resource management, re-engineering, total quality, and dozens of others, each have their own distinct cultures, distinguishable using the dimensions in the model below.

Japan

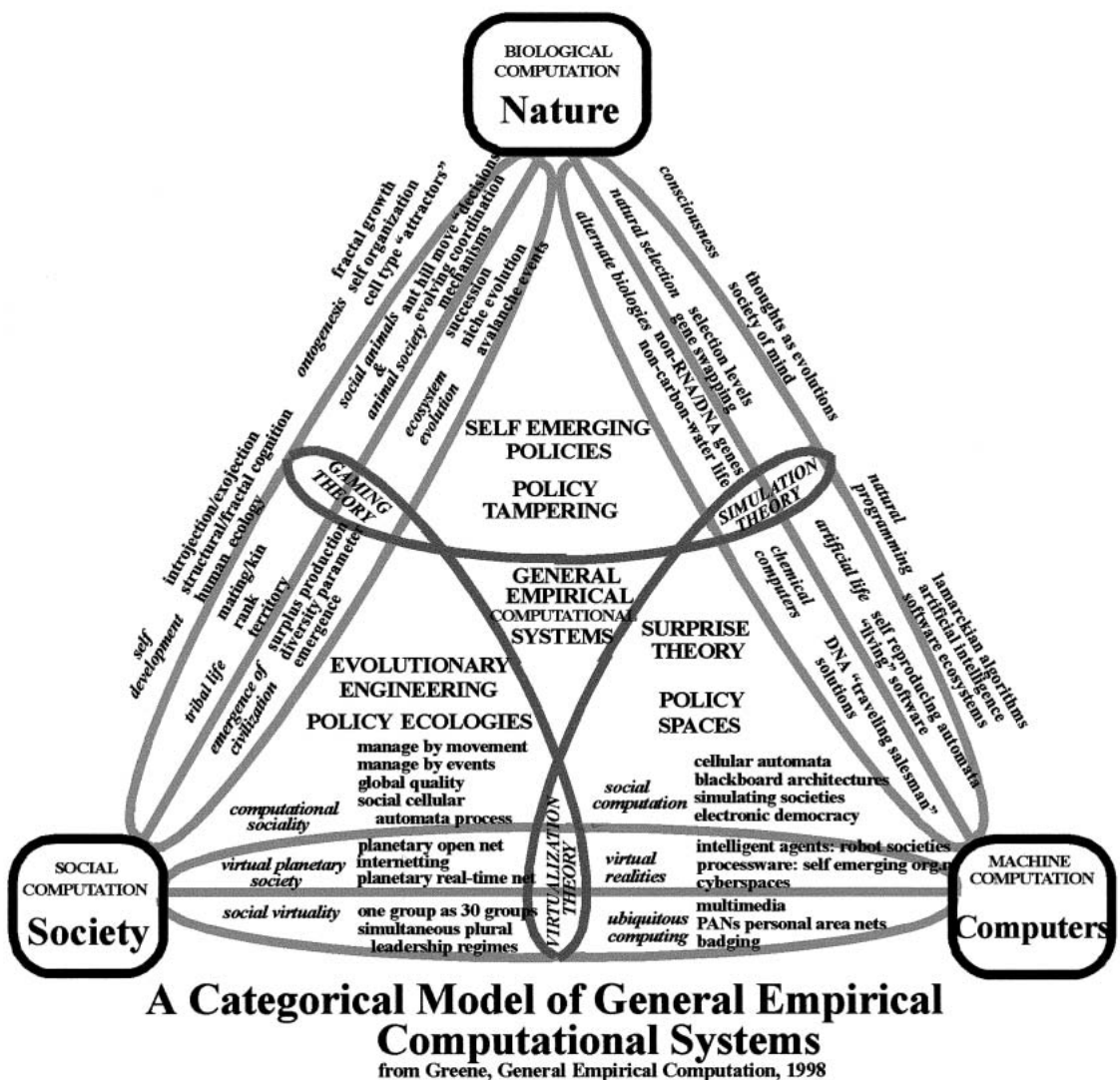## New Forms of Computational System

(Ilgen and Hulin, 2000; Prietula et al, 1998; Gilbert and Troitzsch, 1990; Carley and Prietula, 1994; Gilbert and Conte, 1995; Hannon and ruth, 1994; Gaylord and D'Andria, 1998; Epstein and Axtell, 1996; Durlauf and Young, 2001; Axelrod, 1997; Lomi and Larsen, 2001; Casti, 1994; Casti, 1997; Huggett, 1993; Carley and Prietula, 1994; Luna et al, 2000; Kennedy and Eberjart, 2001; Bonabeau et al, 1999; Ferber, 1999; Bradshaw, 1997; Castelfranchi and Werner, 1994; Conte and Castelfranchi, 1993; Bentley, 1999; Dowla and Rogers, 1995; Davis, 1987; Fogel, 1995; Judd, 1990; Biethahn et al, 1995; Arbib and Robinson, 1990; Amit, 1989; de Castro and Timmis, 2003; Dasgupta, 2003; Olson et al, 2001; Gibas and Jambeck, 2001)

It is obvious to most people that new forms of machine computation are being invented inspired by how biological systems in nature operate (such as

immune computing for computer security systems). The inverse is also true, that new biological systems, inspired by forms of machine computation are being invented (human-designed biological viruses that heal lifeforms by machine-life information functions or strategic feignts they play, for example).   In general machine computation, social computation, and biologic computation systems inspire each other, making for six relationships among them.   Along each of these dimensions we can imagine three or more thematic types making for 18 types of computation mutually inspired among them.   This interaction is a powerful force in many domains generating new methods, technologies, and models of the world.   In contrast to this plurification of computational system type are efforts to simplify by abstracting all this computational diversity. Wolfram's reduction of everything to simple programs, 255 one dimension cellular automata belongs here.

A Categorical Model of General Empirical Computational Systems
from Greene, General Empirical Computation, 1998

General Empirical Computational Processes (from Greene, General Empirical Computation, 1998)

6 Com-puta-tionalSystemTypes	18 Com-puta-tionalSys-tems	39 Com-puta-tion Types	150 Computation Approaches	What gets computed from what:	Representative Hierarchy of Codes:
Machine Computers Mimicking Social Ones	Social computation	Social interaction	blackboards, democratic electronics, simulated societies, electronic democracy	social decisions from individual preferences	preferences, coalitions, votes
		Massive parallelism	cellular automata, population computations	self emergent overall patterns from local agent conditions	unit states, neighborhoods, interactions
	Virtual and cyber realities	Sociable units	robot societies, intelligent agents (softbots)	self emergent patterns of work and task accomplishment from individual unit assignments	cooperations, relationships, communities
		Intelligent message contents	multi-media, organizational computing, processware, self emerging organizations, agile economies	self emergent organization form from work process/capability agglomeration	tasks, roles, processes
		Personal fictive interfaces	virtual persons, virtual organizations, cyber persons, cyber spaces	task accomplishment from personal relationships	physics, geometry, geology
	Ubiquitous computing	Preference following	badging, personal locales, personal area networks	personal information from locations	locations, preferences, facilities settings
		Preference combining	politicized settings, politicized procedures, computed organizations	group interfaces from individual preferences	persons present, preferences present, facilities settings
Getting social computers to mimic machine ones	Computational sociality	Social array processes	manage by movement building, micro institution development, manage by events, global quality, social automata leadership	emergent outcomes from basic unit interactions	basic unit states, neighborhoods, interactions
		Personal array processes	structural reading diagrams, fractal model building, fractal filing, fractal interfaces, chatroom movement building	models from variety	topic names, topic count, topic orderings
	Virtual planetary society	Cellularity	all people in one cellular space, all places 24 hour connected	group space from individual space	interests, communities, events
		Internetting	democratized broadcasting, broadcasting unique computational resources, automated social movement building routine libraries	decentralized systems from centralized systems	homepages, gateways, search engines
		Function specification	just-in-time managing, participatory art, protocol communities	function type, amount, and time needed from regular polling	polling, protocols, social delivery means
	Social virtuality	Virtual groups	one group as 30, plural leadership regimes, marketization of functions	population of intelligent agents from single group	teams, teams of teams (superteams), teams of superteams
		Inversion virtuality	transport locales, outsource virtuality	the presence of a function from the absence of the function	function, opportunity broadcast, market bids
Getting machine computers to mimic biological compute	Natural programming	Artificial intelligence	logic, forward/backward reasoning, qualitative and fuzzy reasoning, expert systems, constraint satisfaction, machine senses		
		Naturalist computing	artificial intelligence, genetic algorithms, neural nets, evolving neural nets, Lamarckian algorithms, software ecosystems	new thoughts/recognitions from evolving message/interaction patterns	nodes states, connectedness structure, interaction types per connection type
		Immune computing	damage detecting immunity, invader detecting immunity, antibody producer ecosystem immunity, accelerated natural selection of antibodies immunity, natural selection among natural selection algorithms immunity	natural selection system from myriad invader/damage encounters	recognition event, variant generation, fittest competition
		De-linearization of knowledge	equilibria to critical systems, key variables to populations of agents, causal models to simulations	dynamic understanding from static understanding	populations of intelligent agents, connectedness/diversity/ patchings parameters, wanted outcomes
	Artificial life	Replicating life	self replicating automata, self organized criticality, percolation systems, fitness landscapes, coupled fitness landscapes	abstract principles of life sufficient to re-create it in new guises from natural selection of codes	one species evolving, other evolving species as environment for that one species, adaptation to evolving environment
		Inventing software life	living software, self conscious software	silicon based lifeforms from interacting software programs	software genes, natural selection among those genes, evolved software species
	Chemical computing	Data populations	DNA computers, polymer information string computers, internet recruitment computer networks	computational processes from chemical processes	code bearing population of chemicals, chemical reactions representing semantic combinations, calculation outcomes
		Scale change computing	quantum substrate computing, football stadium computing	improved types of computing from changes of scale	computational limits, scale change of computer components, new computational limits

R. T. Greene,   Generalized Quality

6 Com-putation-alSystemTypes	18 Com-puta-tionalSys-tems	39 Com-puta-tion Types	150 Computation Approaches	What gets computed from what:	Representative Hierarchy of Codes:
Getting biological computers to mimic machine ones	Altered natural selection	Genetic engineering	altering variant generation, altering selecting fitness tests, altering reproduction, altering inheritance	improvements in nature from improvements in natural selection processes	generation/selection/reproduction/ inheritance, changes in them competing, evolved forms of natural selection
		Levels of selection	altering genes, altering gene-controller genes, altering gene-controller gene controller genes	changes of scale of biologic innovation from changes of scale of genome acted on	genes, gene-controller genes, genes controlling gene-controller genes
		Engineering ecosystems	ecosystem engineering, evolutionary engineering	interventions in evolving self conscious systems that work from changes in design processes	interventions, reactions (thinking and unthinking), community evolutionary process changes
	Consciousness	Recursive modularity	society of mind, natural selection of thoughts	thoughts from natural selection process among possibly relevant thoughts	a situation description, potentially relevant thoughts, variants generated from potentially relevant thoughts
		Experience sequestration	fractal meditation, hobby professionalization, net personae	microcosms of all of life's dynamics from functional components of life	socially partial roles and places, disciplined import of all of life's meanings, re-seen particulars of the partial roles and places
	Alternate biologies	New life, same substrates	Non-DNA/RNA gene systems, Non-protein metabolism systems	alternate lifeforms from same substrates as present lifeforms	code strings, natural selection process, metabolism process
		Life on new substrates	Non-carbon-water lifeforms, electronic lifeforms (artificial life)	alternate lifeforms on substrates other than present lifeforms	code strings, natural selection process, metabolism process
Getting social computers to mimic biological computers	Self development	Introjection, ejection	from being to having, from perceiving to modeling to acting, from others-produced self to self-produced self	smaller more focussed self or model from variety of diffuse experience	unconscious production of a self, de-mystification of that production process, self-determined self
		Talent costing	neurotic selves, neurotic organizations, neurotic nationalities, neurotic lives	costs of talents from unconscious unwanted side-effects of talents	talent, consciously known side-effects of them, unconsciously known side-effects
		Human ecology	political ecology, psychic ecology, organizational ecologies	community species structure from web flow nd niche dependencies	species interactions, niches, communities
	Tribal life	Community ordering	Determining rank, determining mates/kin, determining territories	ordered community from individual ambitions	taboos, ritual combat, rank/status/kin/territory
		Time ordering	traditional community, crisis community, mission community	time design from source of community confidence	sacred time, ritual time, secular time
	Civilization	Tribal self-transcendence	transport-communication infrastructure production, leisure class production, agricultural surplus production, transcendent value production	immense infrastructures and surpluses from aggregating local communities	local community aggregations, infrastructures, surplus
		Biosense replacing mechanosense	emergence replacing design, flexibility replacing rigidity, bottom up social automata replacing top down command, horizontal ranking by contribution replacing vertical ranking by authority	emergence from design	basic unit states, neighborhoods, interactions
Getting biological computers to mimic social ones	Ontogenesis	Organism development	fractal growth, self organization, cell types as attractors	structures from self organizing processes	populations of agents interacting, self-organized criticality, avalanche events
		Organism behavior	directing attention, natural selection of behaviors, selfish gene use of organisms	decisions from natural selection processes	attention alternatives, fitness contests, attention decisions
	Animal societies	Social maintenance	identity maintenance activities, mutual grooming, role salience dependency activities	relationships from local behaviors interacting	local behaviors, interactions, relationships
		Social decisions	ant hill move decisions, bird migration decisions, community fight/flight decisions	group actions from basic unit interactions	basic unit states, neighborhoods, interactions
	Ecosystem evolution	Ecosystems adapting	succession, niche evolution, avalanche events, symbiosis, parasitism	community structure/function changes from interacting natural selection processes	natural selection processes, species evolutionary streams, community structures
		Adapting to ecosystems	affordances, attunements, effectivities	adaptation to an environment from exploration	exploration actions, attunements to affordances, effectivities

Traditional Ways of Simplifying Complexity

The history of civilization is also a history of attempts to make complex realities tractable to understanding and human scale actions. Human harnessing of nuclear energy, the energy that powers the stars, is a 20th century symbol of progress in this direction. Humans learn, master, and control by simplifying and focus, it seems.

Leadership--Making People Feel Like They Are Going Somewhere

(March, 1988; Steers et al, 1996; Thomas, 2001; Bird et al, 2001; Grint, 2000; Chemers, 1997; van MAurik, 2001; Vaill, 1989; Campbell, 1949; Derr et al, 2002; Roehner and Syme, 2002)

A primary function of leadership is making people feel like they are going somewhere. Actual research on the overall effectiveness of leadership and leaders and various ways of leading has usually shown extremely modest if not entirely negative results. A certain somewhat cynical view seems to prevail that leaders take credit for luck and avoid credit for bad luck as their two most important skills. Note, it is not necessary that leaders actually get organizations to go somewhere it is only necessary that they create the feeling in people that they are going.

Organization--Reducing Options, Neighbors, News, and Responsibilities of People

(Warr, 2002; Applebaum, 1992; John-Steiner, 2000; Hirschhorn, 1988; Sternberg et al, 2000; Sternberg and Horvath, 1999; Egan, 1994; Zelinsky, 1998; Citrin and Smith, 2003; Bourdieu, 1984)

Organization, seen generally and abstractly, consists of segmenting. Organization is reduction of scope and scale, nearly entirely. You take people naturally curious about everything and naturally feeling entitled to just about everything and you turn them by organizing them into limited beings, afraid of most contexts and belonging to only a few. Organization is the way people hide themselves and others from all of responsibility and focus on small parts of responsibility.

Customer Focus--Changing Line of Sight from Vertical Hierarchy to Horizontal Divisions

(Oliver, 1997; Cole et al, 2004; Gaucher and Coffey, 1993)

All organization tends to focus the attention of people upward to their superiors in hierarchies. This inevitably extends till internal career environments completely supplant whatever the organization's purpose is in the world at large. For decades computer scientists have noticed that executive information systems are only used by executives (99.998% of all keystrokes in some corporations in typical years) to check their personal stock portfolio wealth several times a week or day, nearly never to get information for managing the business better. This makes academic research on the "effectiveness" of such systems both highly suspect and humorous. Customer focus saves organizations from extinction by supplanting internal hierarchy environments with external customer needs as the primary environment of everyone's daily attention. It simplifies views of the world from career-pluralized narcissisms to serving one set of customers well.

Creativity--Surprising the World More than It Surprises You, The Revenge of Inventing

(Kotkin, 1993; Suleiman, 1996; John-Steiner, 2000; Vaill, 1989; Segel, 1987; Gould, 1997; Munck, 2000; Israel, 2001; Bourdieu, 1984; Jones and Pennick, 1995; Gomgnen, 1999; Green, 1986; Weber, 1986)

Creativity is ultimately revenge we take against the surprises the world gives us. We, via creating, surprise the world more and faster than it surprises us. In a real way, creating is surprising the world precisely as it surprises us. This is the simplification of taking rather than receiving initiative via revenge of surprise makers.

Quality--Making Processes and Products Reliable

(Bowbrick, 1992; Phadke, 1989; Taguchi, 1986)

The natural world is unreliable in weather, seasons, dangers, disease and most other traits. Humans have struggled to erect immense artificial environments, called civilizations, that have the character of reliability so missing from our natural environment. Urban dwellers far removed from living in nature dismiss or mistake this--they lack experience of nature's whims and their devastating effects on human diet, health, and survival. Most service and production systems in the artificial world we erect to protect us from nature's vagaries, at first, vary unreliably. Quality is the name of systematic efforts of humans to make their artificial world systems reliable enough to free our minds up for other pursuits. Quality reduces complexity by making systems dependable and predictable.

Re-engineering--Updating Systems as Substrates Evolve

(Greene, Emergent Re-engineering, 1995; Olson, 2001)

As civilizations diversify and specialize there

are more and more parts to them.   As new social or technical means get invented for doing various functions, it takes time and effort to find where older means for doing those functions are at work, and to get people there to change values, tools, habits, rewards, and other aspects of life.   Re-engineering is the name given to this continual human work of replacing assumptions about how functions get done and assumptions about what social or technical material is available for doing it, as a continual stream of new assumptions and materials passes by.   It reduces complexity by equalizing capabilities through society's systems.

Networking--Expanding Unit of Imagining and Acting, Coordinating, Scale to Match/Surpass Problem Scale

(Leebaert, 1999; Tapscott, 1999; Postrel, 1998; Shapiro and Varian, 1999; Schiller, 1999; Brynjolfsson and Kahin, 2000; Alexander and Pal, 1998)

Network of trade, communication, political alliance and the like are ways that people expand their scale of action-taking to match the scale of their problems and opportunities.   The clearest view of this is asteroids.   Nations of the world unite with rocket and nuclear technology to head off asteroids headed towards earth.   The scale of alliance is expanded to fit the scale of threat.

Geographic Globalization--Expanding Unit of Acting Scales to Match/Surpass Problem Scale

(Cole et al, 2004; Cole et al, 2000; Shiba, 1993)

Similar to networking is geographic globalization.   Here geographic scale alone is expanded to match the scale of problems and opportunities faced.

Venturing--Specializing Structures Around New Products and Services

(Bhide, 2000; Sahlman, 1999; Swedberg, 2000; Brinckerhoff, 2000; Kirzner, 1973; Berger, 1991; Bird, et al, 2001; Sexton and Landstrom, 2003; Birley and Muzyka, 1997; Shane, 2004; Steyaert and Hjorth, 2004; Lee et al, 2000; Fuerst and Geiger, 2003)

This, like creativity, is a kind of revenge on surprise in the world.   You specialize organization around ideas so as to surprise the world.   You match surprise with your own surprises on the world.

Industrial Combinatorics--Alliance Capitalism Generation of Between-Industry Locales of Invention

(John-Steiner, 2000; Braudel, 1986; Gould et al, 1997; Bhide, 2000; Swedberg, 2000; Berger, 1991)

The complexity that emerges from gaps between narrow human specialities mentioned at the beginning of this article, gets reduced by different industries forming combinations and alliances, blending their distinct talents to come up with systems no one industry could imagine or implement.   Automatic automobile navigation systems require construction companies, car companies, GPS satellite companies, cellular communication companies, among others, for example.

Structural Cognition--Operating on Patterns of Ideas not Single Ideas

(Kintsch, 1998; Hobbs, 1990; Myers et al, 1986; Titscher et al, 2000; Schiffrin, 1994; Gelman and Byrners, 1991)

The mental operations that we all apply to individual ideas, can instead be applied to well structured patterns of ideas, multiplying cognitive productivity by factors of ten or more.   The same mental work can, for example, generate 100 plausible inventions, in the same time and quality that others invent ten, by applying the same operations to entire patterns of structured ideas instead of to single ideas.   Structural cognition is a primary way of expanding scale of human thought to match scale of problems or opportunities being faced.   The world's leading colleges, in their entrance exams, test for this ability in prospective students.

Structural Feeling--Having What We Were--Managing Traits Instead of Making Them What We Are

(Kegan, 1994; Arthur and Rousseau, 1996; Cannon, 1991; Maddi, 1996; Diener and Suh, 2000; Roland, 1988; Shimizu and Levine, 2001; Berry et al, 1992; Kasukis et al, 1993)

Our personalities grow when we encounter that some aspect of who we are is getting again and again in the way of achieving our goals.   When we despair of our current self ever getting us to our most important goals, that despair furnishes energy, as it were, invested in reducing the amount of world included in "us", our identity.   We cut off something we formerly considered part of "us" and instead of being it we "have" it, that is, manage it.   Thusly, for example, we learn to not "be" our opinions, but to "have" them.   When you disagree with someone's opinions, if they attack you and defend their views,

you are dealing with an adolescent personality, not an adult. Adults by definition are people who have learned that they are not their opinions but rather they are beings that have opinions that they revise when new data comes along with better evidence properties. This dynamic of continually shrinking what of the world is seen as us and learning to have confidence based on less and less of the world being us, reduces complexity by making us a smaller and smaller target for psychological attacks on our confidence and goals. Our happiness, for example, does not depend, any longer, on requiring others to respect the same friends and people we respect because we learn we are not our sets of friends but we have friends whom we switch or change as needed in life.

Simple Programs--Using General Computational Equivalence to Substitute Simplest Systems for Overly Complex ones

(Wolfram, 2002; Cowan et al, 1994; Kauffman, 2000; Bak, 1996)

Wolfram introduced this idea that absolutely everything that exists, time, space, black holes, brains, civilizations, genes uses several of a few basic simple program types. Since many of these simple program types are universal computation devices, capable of emulating any computation by any possible future or present computer or mind, most of the universe is exactly as computationally capable and complex as our own minds are. Hence, there will be lots of phenomena in the world humans will never be able to predict. This reduces complexity by replacing more complex models of all that exists with simple program models and it simplifies human goal-making by ruling out predicting certain types of phenomena in the world around us.

Adjacent Beyond--Exponential Expansion of Possible Combinations from Each New Invention, Niches from Niches, Take-off

(Kauffman, 2000; Kauffman, 1995; Arthur, 1994)

Complexity can emerge from the exponential growth of combinatorial possibilities as one new discovery or technology opens up niches for others. Each new element invented expands exponentially the number of possible combinations with all past elements. Even if only a small fraction are useful, the numbers are immense for any moderately sized system. Reverse this and you get a way to invent theories that explain growth phenomena in general. A few things combining thusly can rapidly grow into an immensely diverse set. So we can look at extremely diverse complex phenomena and wonder

what small set of combining elements might generate it. This is simplification by reversing take-off phenomena of niches spawned by new niches.

Globalizing Globalization (and Specific Bodies of Knowledge)

Above two types of source of social complexity were delineated, and one set of ways that complexity gets reduced was described. The passive generators of complexity, both cognitive and social types, shrink human scope, making local humans and groups less able, without massive lateral cooperations and alliances, capable of tackling the world. The active generators of complexity--types of system surprise, types of social diversity, and types of computational system--expand situations humans face in terms of what can happen and what needs to be faced or considered/managed. The reducers of complexity divide into social and mental tactics (as do the active and passive sources of complexity). They work by either shrinking scope (of what is faced) or expanding scope (of who and what is responding). We can see two patterns running through all this--scale concerns as one pattern and the cognitive social divide as another pattern.

R. T. Greene,   Generalized Quality

Complexity Sources and Traditional Reducers

	mental	**social**
passive sources	shrink scope of what is **facing** 　　self built identity 　　value relativism 　　demystification 　　futurization 　　ideological selfishness 　　fundamentalism 　　fundamental limitations to human thought 　　civilization ally limited self knowledge 　　changes in commonsense	shrink scope of what is **facing** 　　specialization 　　descartization 　　technicization 　　sequestration 　　commercialization of art 　　mass technology systems 　　marketization of values 　　under and over development
active sources	expand scope of what is **faced:** 　　non-linear system effects 　　diverse forms of social diversity 　　new forms of computational system	expand scope of what is **faced:** 　　non-linear system effects 　　diverse forms of social diversity 　　new forms of computational system
reducers	shrink scope of what is **faced;** expand scope of what is **facing** 　　structural cognition 　　structural feeling (be to have) 　　simple programs 　　adjacent beyond	shrink scope of what is **faced;** expand scope of what is **facing** 　　leadership 　　organization 　　customer focus 　　creativity 　　quality 　　re-engineering 　　networking 　　geographic globalization 　　venturing 　　industrial combinatorics

The above patterns prove nothing but are suggestive. They bring to mind a single case of an awfully massive multi-decade long effort that became a world wide part of businesses everywhere. They bring to mind the total quality movement, a movement that was global in an immense number of ways, a movement that grew global in an immense number of dimensions.   Geographic globalization was the least of these. Total quality globalized the concept of globalization, extending it across a great variety of dimensions.   What is the suggestive connection between the patterns of complexity generation and reduction and total quality's globalization of globalization?

Total quality, to be specific, greatly expanded the scope of what is facing complex situations.   It immensely changed the scope of what was facing challenges to attaining quality.   It totalized quality then globalized it in numerous ways.   The challenges to quality were never one sort of thing.   As each challenge to quality was handled, it merely opened up new vistas wherein new challenges to quality lay.   As each of those was handled, the same thing happened again.   Total quality expanded the scope of what was facing the unknown but still expanding scope of challenges to attaining quality.   Totalizing quality

approaches updated approaches to attaining quality so as to match somewhat the scope of challenges to attaining quality.   Total quality is a case of society handling deeply and for a long time complexity of a specific yet general sort. It may be very instructive to see if things other than quality, complexities other than challenges to quality attainment, given similar treatment produce similarly impressive results. In other words, the possibility exists that totalizing attainment of quality amounted to complexifying attainment of quality to match complexity of challenges to that.   Hence, totalizing attainment of quality invented a tool kit for totalizing attainment of all sorts of other things hindered by rather similar amounts and types of complexity in the world. This paper explores this generalization possibility. What if the way one body of knowledge--quality knowledge--was totalized then globalized, if applied to goals other than quality, handled powerfully complexities of other sorts in the world, not all that different than complexities of quality attainment?

The Case of Quality Knowledge

Key to this investigation then is mapping out just exactly what was done to quality knowledge in the course of totalizing and globalizing it.   What forms

of complexity got handled in doing that, that were not seen and handled before when quality was handled for decades by the quality assurance profession. What other bodies of knowledge, not handled by specific professions, if totalized and globalized, might handle better their own specific forms of complexity?

The Ways that Quality Knowledge was Globalized (Social and Technical Forms of Each)

Below I present a model, from numerous surveys of total quality history of most of the dimensions by which the body of knowledge on quality was totalized then globalized and what forms of complexity each enabled handling in some way or other. This is being done here so that we can examine totalization and globalization of quality knowledge as a possible toolkit that can be easily extended to handle similar forms of complexity cropping up in myriad other domains of knowledge.

The purpose of this work is to establish a correct historical model of how quality was globalized in various ways, abstract away everything from the quality focal point to get generalized operators that might be apply-able to other bodies of knowledge besides quality knowledge to vastly extend their capability of handling the complexities outlined earlier in this paper.

Establishing the Fundamentals of Managing

Globalization 1 [movements formed]: Movement of Movements--among business movement, installs within business movement, among suppliers-customers movement, installs movemental parts of organization

(Cole and Scott, 2000)

What Prof. Kano calls the "vehicle" dimension in totalizing quality is a set of social movement building tactics at its core. Within particular companies quality was totalized by making entire workforces responsible for it where before only one profession--usually called "quality assurance" was responsible. This involves spreading certain goals, methods, measures, rewards, and social supports across entire company workforces using social movement building tactics. This also quickly involved spreading the same across "chains" of supplier and customer companies using the same tactics. It also involved establishing as on-going parts of company structure continual self-change processes having social movement aspects. Quickly this became spread of all of the above across all

companies in particular industries, across all industries, and eventually across diverse sectors of society, till totalization of quality was a world wide movement in nearly all social institutions. These four movements are the first totalization of quality--movement within firm, movement across chained firms, movement aspects installed, movement across single societies, movement across nations.

Globalization 2 [stages of belief]: Disguise-Fad-Method-Paradigm (Cole and Scott, 2000)

Within any one firm, chain, structure, sector of society, or the globe itself, stages of belief were encountered, usually in identical sequence. Totalization of quality was first seen as a thin disguise around unfair Japanese competition. There is nothing to it but disguise value in this view. People tried totalizing quality, an unnatural act, only because they were forced to by Japanese quality attainments penetrating their markets worldwide. People almost never tried it because of virtue, inner conviction, or a general desire to improve. They tried it after Japanese competition either drove their own firm near extinction or drove one or more of their major competitors to the brink. This "it's disguise" phase gave way a "it's a fad" stage. Here firms denied any deep value to quality totalization and saw its movemental spread as sign of shallow fadism at its root. It was seen as merely a crowd phenomenon in this stage. This stage was followed by seeing totalization of quality as a particular method for addressing quality. It took several years of seeing quality as disguise and fad before this stage was reached. The method phase gave way later to a paradigm phase in which quality totalization was seen as a new way of viewing many things in the world besides quality. All of business was redefined by it, in this view. Indeed, in not a few places, higher education, government, careers, and more were revisioned in this phase. These phases of belief and conviction were globalizations of quality from periphery of consciousness to core of consciousness.

Globalization 3 [control]: War on Variation--variation reduction, statistical common and special causes, 6 sigma

(Cole and Scott, 2000; Shiba, 1993)

The original emphasis when quality was first totalized, in ideas in the US (by Feigenbaum, Juran, and Deming) and in action in Japan shortly after the Second World War, was war on variation. Understanding variation was key at that time. Feigenbaum elaborated this into a technical machinery for quality control, Deming into a

statistical machinery, and Juran into a management machinery. Quality achievement and variation reduction were nearly synonymous in quality's early days. This was a reflection of nothing profound about quality so much as something profound about industrial self control in general. Quality "control" was not a lot different than profit "control", personnel "control", market "control". The issue was any sort of getting to actual causes beyond the mask of blaming lower level people. Quality totalization's first agenda item was teaching managers when and where to manage anything and what managing anything consisted of. Quality totalization began with the issue of getting management to appear, after decades indeed centuries of playing at it. Quality first tackled getting management and workforces together to manage processes, any processes at all. Till they understood what managing consisted of, what it looked like, what it felt like, then they would "manage" any approach to quality as badly as they traditionally "managed" everything else. Quality first established a minimal form of management of some part of the enterprise. The issue in warring on variation is not variation; the issue is using variation to teach managements and workforces together what "managing" anything is.

The original quality totalization of war on variation started simply with trying to reduce variation in process outputs that displeased customers. A lot of obvious dumb things infested processes everywhere that made processes out of control. If "in control" meant centered around a trait that customers valued, then "out of control" meant not hitting that trait very much, hence, greatly displeasing customers. The next step was getting causal knowledge of what was causing the variation. Here statistical knowledge was key because there were causes of variation inherent in how processes were designed and other causes not part of that, more incidental or "special" as they were called. Distinguishing on statistical terms, common from special causes of variation characterized this stage. Six sigma campaigns, a next step, simply applied more stringent measures of the variation to be allowed in process outcome traits and hence in intermediate causal process step traits. Key to six sigma, though unfortunately omitted from a great many such campaigns, is invention by workforces of new measurement tools, allowing more precise measures and automatic basic statistical analysis and display. These so-called "measures for six sigma" or "measure automation" campaigns usually were parallel to, preparatory to, or folded in with

six sigma ones. These four steps--obvious causes, statistically distinguished causes, stringent measures, and measure invention and automation--represent discovering the contents of management. In learning to find and act on causes, in learning to collect and analyze data statistically in order to distinguish cause types, in order to reveal layer after layer of causes of variation, entire workforces and their managements learned a type of management directed at processes, so as to influence outputs of them that affected customers, and that was directed at causes, not top of the head intuitions about what bad employee had messed up something. The overt agenda was controlling variation, the covert agenda was learning what "control" meant on a scientific fact-based basis instead of a "I am a higher authority than you are and anything I wish goes" basis. Companies missing this covert agenda had funny little statistical programs all over with no or nearly no lasting results.

Globalization 4 [promoting customers]: Customer Orientation--customer pull, customer responsive org, quality is what the customer says it is
(Oliver, 1997; Hayes, 1992; Greene, Gathering Customer Requirements, 1998; Greene, Establishing Customer Requirements, 1999)

As causal analyses by one group then another built up over time, many of the same causes began to appear. It was apparent to all that everything in the entire organization, every last bit of culture, training, incentives, habits, traditions, viewpoints, and the like, pulled everyone away from attention to customers and instead upward towards bosses. The dynamics of making a career in the view of powerful bosses completely extinguished any room for, interest in, or attention to customers. In organization after organization, all attention was upward, none was horizontal, along processes to customers of their outputs. Quality, already totalized and with belief globalized, expanded towards customers. Every bit of each organization was reseen, reconnected, remeasured as to its impact on customers. Everything that got people looking up instead of looking left and right was suspect, examined, and revised.

The first stage of this was the customer pull stage of kanban cards bicycled to nearby suppliers as automatic ways to re-order re-invoice inventory just-in-time at exactly when needed. This was followed by a customer responsive organization stage of defining management's primary task as removing blocks in the organization that prevented employees from serving customers better. The next stage was a

revision of definitions of quality, sloughing all sorts of technocratic ones of past pre-totalized quality efforts, and replacing them with "quality is what the customer says it is" for only that definition removes arguments with customers about it, arguments which companies always ultimately lose. The fourth stage of this was interiorizing customers inside company systems, including them in social systems for customers, co-designing with them, and the like. Turning customers into managers, of the old authoritative sort and of the new statistically directed at causes sort, was what all these stages ultimately were about. From the arbitrary power of men in hierarchies, to the arbitrary power of what customers say they want--customers are the new managers in this globalization type.

The Cost-Benefits

Globalization 5 [interiorize]: Evolving Fitness--standard, use, cost, latent requirements
(Bergman and Klefsjo, 1994; Shiba, 1993)

Concepts of what a "fit" product was changed along with the above changes. From conformance to standards of the firm or industry, to fit for uses that customers put products to, to fit cost, to meeting unexpressed latent requirements in customers, the fitness idea evolved. The trend here was clearly from articulate to inarticulate, from formal to intimate, from objective to inside the mind. Here quality was globalized towards deep interiority of definition, getting inside the mind more than customers themselves could to define it.

Globalization 6 [self funding]: Self Financing--free quality, self funding, cost of quality, multi-satisfaction dimensional costs
(Greene, 1993; Rust et al, 1994)

Concepts of the costs of getting quality evolved along with the above changes as well. Quality was free to achieve, at first, because examination of processes that it entailed nearly always found wastes, the elimination of which more than paid for changes in such processes needed to improve quality (reduce variation). Quality was later seen as self funding because of the impact that improving it had on sales, re-purchases, upgrades, profits, and future revenue streams to the company. The costs of quality were more than covered by increased customer retention, purchase, and upgrades. Later still quality's cost became an actual object of research, looking at the cost of failing your own quality standards, the cost of having low standards, and the cost of opportunities lost because of poor quality. Finally, the cost of

quality was measured by multi-dimensional models of the twenty separate dimensions of any product or service that satisfied customers or not, with costs of poor quality calculated for each. This was globalization of quality as globalizing calculations of its costs (and benefits).

Globalization 7 [ergonomics]: Human-scale systems--failsafing, TPM total preventative maintenance, study-action cycle, line-centered organization ideal
(Greene, 1993; Shiba, 1993; Cole and Scott, 2000)

What dangerously gets lost in cultures that are hierarchical, technical, cognitive is the ordinary worker human scale of things. As a result totally unattainable unrealistic goals filter down to tens of thousands of people who take the ridiculousness of their orders as a measure of how utterly contemptuous of them management and leaders are and how utterly out of touch with reality technical and systems people are. Here, systems are globalized to incorporate more and more of the actual constraints and capabilities of the majority of people actually doing/implementing things.

Globalization 8 [optimize]: Minimax--minimizing loss to customers, maximize signal to noise ratio, optimize ideal energy flow, optimize line not point values
(Phaedke, 1989; Taguchi, 1986; Greene, 1993)

This globalization of the quality body of knowledge extends optimization towards systems and root causes away from visible symptomatic performances. Optimization work drifts inevitably it seems towards the easy to see and easy to fix, and away from the deep systematic highly distributed causes that work most powerfully to control myriad outcomes. This globalization reverses that drift, forcing optimization more and more towards profound system-wide deep causes and away from mere symptoms. Some readers will recognize Genichi Taguchi's work here (commonly mistaken for typical design of experiments work by technocratic US experts).

Making Essentials Visible

Globalization 9 [clear waste]: Waste Reduction--low hanging fruit, buddhist trance of "no obstruction", eliminate creativity noise of career system
(Greene, 1993; Akao, 1990)

Here, definitions of waste are globalized from the easy obvious kinds of things that anybody knows

about, to an almost aesthetic of clear line purity and open mind clear heart buddhist trance to market. The definition of waste is radicalized towards mental and emotive components beyond physical sorts of things.   This is the counterpart to Taguchi-style optimization of ideal energy flows in globalization 8 above.

Globalization 10 [science]: Democratizing the Scientific Method--managing by fact, quality circles, 7 statistical tools, 7 management tools (standardized tool sets)--
(Ozeki and Asaka, 1990)

Sequential whole unit of competition deployment of one new tool set after another, each accompanied by specific application procedures for improving work in specific directions, gradually installs the full scientific research method that Ph.D. students at places like MIT learn. This actually progresses till 1200 or more workgroups a year in some Japanese companies develop multi-variate statistical definitions of what the problem is, similar treatments of what the cause is, similar of what the solution that works is, similar of what the way to implement widely that solution is, and similar of what the total effects of all this are.   Nothing similar in any US or European workforce has ever been documented. Distributing the scientific method, incrementally this way, turns blue collar workers into Ph.d.-like researchers of their own work processes, vastly increasing the educational level of entire workforces and forming a hard resilient block to ignorant managers and their efforts to manage by intimidation or rank or opinion or gut feel. This particular globalization of the quality body of knowledge installs the full scientific method of research to replace management by intimidation, rank, and opinion. It equips workforces to survey and stop inept or lazy manager regimes. Workgroups start proving with valid data, again and again, that manager whim and authority are poor substitutes for finding causes using valid research tools. Given the culture of most US MBA programs you could also call this a "barrier to MBA ideology" embedded in entire workforces, by increment.

Globalization 11 [remove hiding places]: Debuffering Processes--tolerance inventory, physical inventory, idea inventory
(Greene, 1993; Taguchi, 1986; Gaucher and Coffey, 1993)

Here attainment of quality is hindered by large inventories, used as hiding places for poorly designed and executed processes.   One by one such inventories are found and eliminated here to expose actual status of process execution.   The idea in this globalization is more and more exposure via more and more removal of hiding places for poor design and execution of processes.

Globalization 12: Process Engineering--architecture, modeling, re-engineering, virtualization
(Olson et al, 2001; Greene, 1993)

When hiding places are stripped bare and the actual state of processes is evident to all, then basic improvement can be applied to processes, including in the beginning, getting the architecture of what processes exist and what other process any one process relates to made clear and stripped of waste processes and processing.   Here what processes are needed and how processes are delivered are rationalized, stripped of waste, and optimized.

Organizational Inclusion

Globalization 13 [cover]: Social Leveling--big and small quality, more numbers to manage to, workforce mobilization excuse, personal quality
(Roberts, 1995)

Getting entire organizations involved in attainment of any goal is a type of globalization of goal attainment. At first total quality lives alongside quality assurance. Eventually the old relics dwindle away, replaced fully by statistical tools.   At first quality is just a different set of numbers to manage to, for career boosts, but that dwindles away, replaced by quality as the only path for career success (mastery of quality tools required for promotions as one gets higher up in hierarchies). Similarly, quality at first serves as a kind of excuse to mobilize and empower parts of workforces subservient under male hierarchy regimes.   It is an excuse for empowerment. This gets replaced by quality as genuine way to increase everyone's power by making everything address actual causes instead of authority figure personal opinions and impressions. Similarly, it becomes an empowerment excuse for individuals who reconfigure and retool themselves with quality goals and methods.   In this way the quality goal gets globalized to cover all scales and scopes of the workplace.

Globalization 14: Border Dissolution--moving borders, boundarylessness, systems distribution of causes and solutions
(Cole and Scott, 2000; Greene, 1993)

The departmental hierarchy that bureaucratic organization form creates makes people not see

across borders, not dream across them, not measure across them, and not take responsibility across them. Getting everyone in an organization to see, measure, and work towards ultimate results that impact customers and markets requires dissolving borders in various ways and systems, both social and technical. This globalization achieves this dissolution in stages, first by extending borders, then by outright dissolving of them (making processes primary), then by distributing thinking, solving, implementing across entire processes rather than keeping thought tightly bound up in small narrow departments.

Globalization 15: Market Interiorization--reflective work, job plurification, maintenance/kaizen/leap management, market relations into firm as next step my customer
(Shiba, 1993; Greene, 1993)

When each function or department next to me is my customer, when work inside organizations is put up for bid and given to the team making the best bid, when people are invited to volunteer for and do as many different jobs as they have ambition and cleverness for each week, then more and more functions are being market-ized. Globalizing via taking the bureaucracy out of doing functions and putting those functions up for market based bids brings the core of the capitalist economy--competiti on--into execution of functions. It extends the core of the economy to deep inside of firms. It reduces conflict and complexity where bureau meets market.

Globalization 16: De-verticalization--horizontal management, de-turfing, de-professionalizing a body of knowledge (quality)--
(Cole et al, 2004; Greene, 1993)

The problem is empires. If I structure everything as departments, they become empires used to propel the careers of a few at the expense of the careers of many. If I structure everything as processes, they become empires used the same way. If I structure everything as events, they become empires used the same way. So what has to be done is transitioning from one structure type to a better faster more flexible one while also blocking and removing empire elements that people try to build up within each new structure type. The problem is also professions. Whether or not empires are being built, new areas get professionalized, eventually to the point that only specially anointed people are "qualified" to work in them, followed by a host of other more or less entirely self-serving restrictions of the budding professionals. This adds another needed element--blocks to and removing of professionalization elements in new

structure areas. Globalizing a body of knowledge here means successively blocking human empire, profession, and similar tendencies.

Transparency

Globalization 17: Diversity Focus--aligning human magnets, use entire workforce mindpower, line-centered organization systems
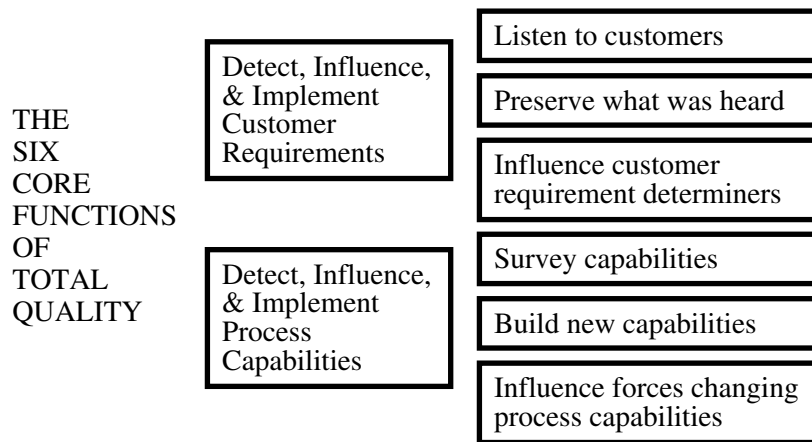**(Kawase, 1990; Greene, 1993)**

CEOs like to talk about alignment, perhaps using it as a euphemism for "do what I say, not what you say". Alignment, however, is not one thing done one way at one time. It is a campaign, over many years, with new methods deployed and new more stringent and psychically deep measures of it deployed along the way. In short, it is a globalization of a body of knowledge in the direction of getting complex multifarious organizations or sets of same to pull in the same direction. It starts with overt obvious measures of alignment sharing and evolves to deploying all the diverse talents and capabilities of entire workforces in single directions, then evolving to an ideal of managementless workforces, with no cost-only functions like management, headquarters, advertising departments and other pure forms of overhead cost. It evolves, in short, from getting all to pull in the same direction to getting rid of functions not adding value in that one direction.

Globalization 18: Basic functions
(Bergman and Lkefsjo, 1994; Greene, Managing Complex Systems, 2002)

Too many globalizations and fundamentals begin to slip between the cracks. However, successive globalizations leave behind a residue of insight about just what functions are fundamental and what are not. It is the combination of these two that results in this globalization, a sort of "back to basics" one of successively installing very fine versions of each key process below. What is vital is balance among each pair, that is, each step in listening to customers matched with a step in surveying new process capabilities out there in the world somewhere that could be installed to supply what customers, newly listened to, are found to want, and so on.

THE SIX CORE FUNCTIONS OF TOTAL QUALITY	Detect, Influence, & Implement Customer Requirements	Listen to customers
		Preserve what was heard
		Influence customer requirement determiners
	Detect, Influence, & Implement Process Capabilities	Survey capabilities
		Build new capabilities
		Influence forces changing process capabilities

Globalization 19: Visualization--visual self management (control points, manage by signal), iceberg inarticulate 2/3s, quality cognitive architecture

(Greene, Managing Complex Systems, 2002; Brudney e al, 2000)

An art critic from an alien world, arriving by spaceship, in the midst of some company would notice that what is important to the local people there is not evident in what is visually evident there. That is the most visible things are no indications of the most important things. This gap between what is visually evident everywhere and what is of prime importance everywhere has large scale and important consequences. It produces stupendous errors, rarely, and myriads of smaller ones every day. There are many size scales to this--what is visually evident in some manufacturing line, whether all processes are visually unified and identifiable though parts of them are done in separate facilities, whether emotive and inarticulate requirements everywhere are visually evident, whether walls, ceilings, cabinets, boards make visually evident what is most important. This globalization amounts to extending across facilities from small size to large size, unifying themes across diverse facilities, till all that is most important is what is also most visually evident in each facility.

Globalization 20: Transparency to Voices--of process, of president, of customer, of supplier

(Akao, 1990)

There are four fundamental directions, up, down, left, and right, and organizations have them as well as individual persons.   This globalization is extending through all four of such directions transmission without distortion of all the clients of each direction require. This means getting what customers require, suppliers require, presidents and investors require, and lower in hierarchy employees require well transmitted.

Capability Inventions

Globalization 21: Social Cleavage Mobilization-- whole workforce research system, socially virtual firms, leadership cohort shifts

(Greene, 1993)

There is a lot of diversity within large organizations though one would never know it from the way leaders ignore it all or dislike it where it raises its head.   Truth is, few know what to do with diversity.   This globalization happens when and where people do know what to do with it. If you assign research roles to every workgroup, say for example, on Fridays of each week; if you assign people two jobs, one from Monday through Thursday every week and the other, in an entirely different firm, that exists only on Fridays; if we take all the managers away from one product development project and replace them all with people 20 years older, or all females--if we do these sorts of things we use social cleavage types of diversity in the workforce.   It is one thing to have forms of diversity, it is quite another to actually put them to constructive use.   This particular globalization of a body of knowledge involves successive such uses of successive such types of social cleavage diversity in a workforce.   It globalizes what diversity is use and what use to which it is put.

Globalization 22: New Competency Inventions-- library of reliable technologies, general science of improvement, cycle time reduction, co-design with customers

(Phaedke, 1989; Taguchi, 1986; Greene, 1993)

People tend to create product development projects that mostly do not develop products but handle reliability problems when they use un-proven new technologies. We call them "product development projects" but they more rightly should be called "reliability fixing projects" for that is what occupies everyone's time and care. When, instead, firms develop technologies with one stream of projects and products with a coordinated but distinct stream of them, wonderful things happen for product development projects have reliable new technologies instead of unproven ones to use. There is a tendency for myriad problems to get defined by hundreds of workgroups across decades with no general survey and summary, synthesis and model, produced. That is large organizations tend to not learn what they know--distributed separate learnings stay separate and unavailable. If, instead, myriad workgroups all learned what all workgroups learned about improvement through decades of individual workgroup projects, then immense improvement might result. In other words, an organizational learning project focussed on getting learning by each workgroup that improved some process made available, suitably summarized and synthesized, to all current and future workgroups, offers much improvement in improvement efforts. Now consider cycle times for getting things done of various sorts and techniques for reducing such times. Consider also links to customers that allow them to input when new products or customer needs are being considered. These are but four of millions of new capabilities firms can develop as new customer requirements reveal a need for them. This globalization is simply expansion of a firm's library of capabilities.

Globalization 23: Cognitive Depth--deployment of sets of 5 questions, cognitive competitiveness, quality of cognitive functions like reading, writing, speaking, feeling production

(Roberts, 1995; Gaucher and Coffey, 1993; Greene, 1993)

The quality of cognition in an organization is usually adjusted by a long stream of new themes in hiring, taking decades to show major effects. However, if in the past, sets of standardized tool sets (7 statistical tools, 7 management tools, 7 simulation tools, 7 work coordination tools and the like) have been deployed, one after another, across varied

topography of one or several related workforces, then similar tools for improving power of various cognitive operations in the mind becomes feasible and even natural, non-controversial. This can start simply with deploying questions to answer, measures of cognitive power of self versus competitor firms, measures of quality of various cognitive activities used daily and hourly, and so on. Globalizing from easy tools for cognitive competitiveness achievement to advanced challenging tools, is another important globalization of any body of knowledge.

Globalization 24: New Bases of Competing-- competing thru mundainities, new unit the cross- unit replacing corporations, SWAT authority systems

(Frederickson and Johnston, 1999; Ashworth, 1995; Greene, 1993; Cole et al, 2004)

There is the matter of inventing entirely new types of capability. This requires real imagination and creativity. This form of globalizing a body of knowledge works it into extremely fundamental categories of existence. Mundane most activities are embedded with the body of knowledge, coalitions of organizations are structured around application of the body of knowledge, instantly assembled teams for newly defined tasks are assembled around it, and so forth. SWAT authority means that instead of fixed amounts of authority in a system, this allows fluid amounts of authority, the total being some function of the total scope and number of teams commissioned at any one time. In short this globalization embeds the body of knowledge in diverse fundamental parts of the world. Knowledge has to be embedded somewhere if it is to be efficacious.

Knowledge Deployments

Globalization 25: Re-engineering--changing functions about what functions to do, changing functions about how to do functions, changing social materials for doing functions, changing technical materials for doing functions, aligning social and technical materials into platforms

(Greene, Managing Complex Systems, 2002; Roberts, 1995)

Re-engineering, downsizing, and total quality all apply the same quality body of knowledge: total quality to define what is essential with it, downsizing to eliminate the non-essential with it, and re-engineering to do the essential functions with updated assumptions and social/technical materials now available. Re-engineering simply globalizes by updating substrates for doing work functions, from

time to time, whenever the outside world burps up new relevant capabilities.

Globalization 26: Liquefaction of Structure--deploy processes across supply and customer chains, dissolving organizations in common infrastructures via outsourcing, automating process deployment across organizations, replace departments with processes and processes with events

(Arthur and Rousseau, 1996; Cole and Scott, 2000; Greene, 1993)

One of the most profound globalizations of any body of knowledge is this--liquefaction. It is a kind of melting--stiff rigid things become fluid and flow. Flowing things lose viscosity and flow faster and smoother. At first processes are made to melt across entire chains of workforces better and better. Next organization components melt into outsourcing contracts by better, cheaper suppliers than internal bureaus. After that the regular deployment of processes gets automated, using software and face-to-face mass workshop events. This globalization culminates in dissolution of structures into processes and of processes into events. Every function that can be done by something faster and more flexible gets done by it.

Globalization 27: Learning Leverage--org learning and knowledge depositories, emotive rationality, high performance, create world best customer taste

(Vaill, 1989; Brown and Duguid, 2002; Greene, 1993)

A certain intensity to learning produces high performance of various sorts, depending of the sort of learning thusly intensified. This can start as getting teams to deposit, some standard way and place, what they learn after projects. It can grow into new rationalities infused with the logic of emotions that allow fuller representation of needs and wishes, desires and satisfactions to flow through ever more transparent systems. It can result in high performance teams, alliances, and chains of organizations. It can result in customers teaching themselves to be world leaders in taste. Intense learning, deployed from teams to depositories, deploying emotive rationality throughout company systems, deploying high performance among teams, deploying world best taste achievement among customers, is a further way to globalize any particular body of knowledge.

Globalization 28: Organization as Theory--the corporation as experiment, products as experiments, ventures as experiments, just-in-time creation of corporations, game-simulation-groupware continuum, agile manufacturing

(Greene, Social Cellular Automata Process, 1997; Greene, 1993)

Creativity can be liquefied as well. If things structured as bureaus instead get structured as provisional arrangements that produce data to validate their utility or suggest ways to restructure them, then organization becomes experiment. This in effect liquefies structures. It is not only organizations that can be thusly turned into experimental forms. Products, venture businesses, and others can be handled thusly. This eventually becomes systems that automatically suggest, recruit, and form corporations when new constellations of customer needs or process capabilities are detected across electronic networks. This, in turn, can result in entire economies, more liquid, in that they dissolve into immense repertoires of outsource suppliers of myriad services that can be nearly instantly configured into entire corporations for periods of time that then dissolve back into repertoire from. This is globalizing a body of knowledge via turning fixed forms in it into experimental forms to be validated or revised by the data they produce. They are structured as data collection means.

Diversification

Globalization 29: Diversifying Diversity--stages of culture penetration, stratifying responses, culture characterization dimensions

(Greene, Leveraging Diversity, 2000; Greene, 1993)

There are lots of diverse types of diversity in large multi-national organizations. However, till we have a way to measure and model that diversity within any one type of diversity, it comes to us fairly simple and un-diverse. In other words, though we may know it is there, without a way of making specific, naming, and differentiating the diversity of features within any one diverse dimension of something, that diversity is not apparent, there, to be remarked and acted upon. Indeed, without naming it may not even be noticed. Since much of the reaction to dimensions of diversity is emotive, many people may be unaware of their own responses or of the responses of others. Tools that elucidate, differentiate, qualify, and quantify diverse features of any one diversity type encountered, make the world larger, bringing more of it into awareness, action, and influence. This globalization is achieved by finding

or devising, then deploying a stream of such tools, that, in turn, produce streams of new features visible and influenceable in the world.

Globalization 30: Management Delivery Alternatives--manage by balancing, manage by events, manage by building movements

(Greene, the Selection Automaton Model, 1999; Greene, 1993)

So many tools, results, changes, impacts, profits, alternatives, inventions accumulate via the above listed actions in globalizing a body of knowledge that what, before all of that, was called "managing" begins to look lamer and lamer, and eventually, totally inadequate for any purpose. In other words, the cumulative result of the previously described (above) globalizations, is the defining of an entirely new definition of managing. From the viewpoint of that new definition, existing "managers" rarely if ever manage anything and what they do and now call "managing" largely fails to execute any of the basic functions of managing. Indeed, having managing functions delivered by a fixed inventory of people, a social class, called "managers" with better parking and clothes and perks than other employees, has dual costs of needed managing functions going undone and unneeded ones getting done to fill time and "look" managerial. The question, then, arises--what other ways are there for delivering various management functions? Nearly all the intuitions, insights, and gut feelings of existing managers can be plotted out on highly abstract dimensional models of workplace dynamics (of psychic, social, anthropological, economic, political and other sorts). Managers from experience build up such models in their minds, whether fully conscious or not, and use them to spot imbalances among such dynamics. Correcting such imbalances is then something such managers suggest, astonishing others, not having their experience, with their insightfulness or intuitive powers. Hidden means turns judgements into magic performances. This can evolve into delivering managing functions, not by abstract imbalance models, but by events, mass workshop events, wherein world best protocols for doing some function are done by dozens of people working in parallel workshops. This can evolve into delivering managing functions by social movements deployed over complex assemblages of companies, processes, or workgroups. This is globalization of a body of knowledge via extending means of delivering management of the dynamics implied by that body of knowledge.

Globalization 31: Software Quality--root cause specification of systems, tandem of social with software feature, group programming, programming markets

(Greene, 1993; Greene, General Empirical Computation, 1998)

Software is not one new technology but a whole host of new technologies. It is a new intelligent medium, alongside human brains, in the universe. Therefore, economies, managers, and firms have been slow to figure out just what to do with it. Many firms, for example, were surprised to suddenly one day find they were primarily creating software not hardware. They were led and structured as if they were hardware firms but all the value add that customers benefitted from came from the software they created. Thus, software is a new medium of intelligence, not merely a new technology. It delivers hosts of new software technologies, one after the other, to the world. Given this scope to software, it is key to direct it at workplace root causes, to team it up with social tactics rather than stupidly thinking that technology alone gets things done, to apply all the globalizations above to how software gets produced. This globalization of bodies of knowledge involves doing to software all that the above globalizations did to quality. Thusly software, unique among all the globalizations presented here, introduces the idea that all the globalizations done to quality could also be done to entirely other goals and means of work.

Globalization 32: Movement Globalization--unite 10 quality related movements, value meshing practices

(Greene, Social Cellular Automata Process, 1997; Greene, Evolutionary Engineering, 1996; Greene, Quality Globalization, 2000)

Software, however, is not the only breakthrough item in this list of globalizations of bodies of knowledge. Movement Globalization involves extending this entire sequence of globalizations to a sequence of related but different other values or means in the world. For example the global environment movement, pursuing quality of the earth, can use the entire apparatus of quality and quality globalizations presented above, to further its aims by enabling it to better handle complexity, such as those sources of complexity that started this article. However, that example extends quality to other movements towards other forms of quality. We are not limited to forms of quality. We can pursue software for example, or democratization, or internet forms of doing business, or venture clusters. Where

plural such globalizations intersect value meshing practices can be invented that allow multiple objectives of multiple globalization efforts to be simultaneously fulfilled. This is the most global of the globalizations listed here.

Biologic Commonsense

Globalization 33: Non-linear Management--emergence replacing design, evolutionary engineering, manage by tuning interacting population units

> (Greene, What Complexity Theory Can Contribute, 1997; Greene, Evolutionary Engineering, 1996; Greene, A Garbage Can Model of Creativity, 2001)

The directness of powerful males naming an objective and arranging resources till it is achieved satisfies many people now and is demanded by most now as a way of work. However, it is being replaced, more and more, by an indirect approach, common to females, of intimating an objective area and setting up interaction populations of units from the tuning of the interactions of which better-than-wanted results eventually emerge. Spotting that emergence amid much intermixed noise is a primary skill of management in this regime.   Similarly, management can be extended to changing design and decision to handle better systems that self consciously evolve. Our traditions of managing are mechanical, based on fixed mechanical means interacting in predictable ways to produce fully imagined results.   Whenever, however, it is not inanimate physical products that are being designed or managed, such habits of work deform results or fail to obtain good ones entirely. Special design and leadership regimes, tailored to handle systems that self consciously evolve, that is, that react to being designed in unpredictable ways, changing the rules of the game in mid-game, can be devised.   This way to globalize bodies of knowledge adjusts them for being managed in these more biologic ways.

Globalization 34: Invention Quality--knowledge management, cognition platform upgrades, creativity platforms, creativity automation

> (Greene, Selection Automaton Model of Creativity, 1999; Greene, A Garbage Can Model of Creativity, 2001)

Creativity eventually becomes a target of globalizations.   We can globalize any body of knowledge by extending support for creativity with that and in that body of knowledge.   How can creativity thusly be extended? First, the production and use of knowledge can be managed, in biologic

ways.   Second, tools for types of cognition that entire workforces use, can be invented, deployed, implemented, measured, and improved.   Third, such tool sets as platforms of cognitive performance can be upgraded regularly or as competitor developments indicate.   Fourth, constellations of social and technical tools can be configured especially in support of particular models of creating or steps in creating processes.   Fifth, tools can automate steps in creating.   These are ways to globalize achievement of creativity with any particular body of knowledge.

Globalization 35: Biologic Management--social automata leadership, micro institution development, viral growth, open systems Linux

> (Greene, Social Cellular Automata Process, 1997; Greene, Quality Globalization, 2000)

A second layer of biologic can influence management, giving rise to social versions of cellular automata software, and micro forms of institution that grow the way viruses grow, till entire nations are covered, and open systems volunteer consortia, like the Open Software Foundation, that elicit public competitive donations for the reward of respect and repute.   This is globalization of a body of knowledge by making management of that knowledge more biologic.

Globalization 36: Social & Technical Virtualization--department/process/event virtualization, game-simulation-groupware continuum, computational sociality, social virtuality, software sociality

> (Greene, General Empirical Computation, 1998; Greene, Quality Globalization, 2000)

The final globalization replaces face-to-face systems with electronic network ones, with departments, processes, and events done across networks, not necessarily simultaneously, allowing organizations that exist only 4 hours a week spread across the entire global with volunteers or market bidders as workforces that change daily, for one example. Similarly games can be devised that grow into simulations of real systems that evolve into actual work coordination software that does real work. This allows new ideas to be tried out in game form, perfected in simulation form, then deployed for actual work in work coordination software form. Social virtualization exists too. It involves, for example, socially virtual firms, that exist only 4 hours a week, the entire firm's work done as a hobby by a group of people. Social connectionism and software socialities (object oriented, neural net, genetic algorithm forms of organizing people) are also

included in this.   Here ways things are done among software objects in computers inspire new ways for people to socially do things. This virtualization type of globalization, globalizes bodies of knowledge by implementing, developing, and applying them in the virtual software world where things geographically impossible can easily be done at low costs with more complicated arrangements automatically coordinated by software and net events.

Globalizations of the Globalization Concept: Handling Complexity by Globalizing Bodies of Knowledge

THE RESULT: A MODEL APPLY-ABLE TO ANY BODY OF KNOWLEDGE TO HANDLE COMPLEXITY

	Globalization Type	Abstract Function, for Application to Any Body of Knowledge	Way It Handles Complexity
Establish Management Fundamentals	1. movement of movements	• actor scale expansion • volunteers elicited per topic • standardization of tools across hugeÅ@scope	expansion of scale of doer to match scale of problem/opportunity
	2. stages of belief	• time scale of commitment expansion	expansion of time scale of doer to match scale of problem/opportunity
	3. war on variation	• management invented via cause focus	recurrence of problems type complexity eliminated by addressing causes
	4. customerization	• opening to external environment • career caused narcissism weakened	exterior environment addressed rather than left unseen disrupting chaotically plans and career ambitions
Establish Cost-Benefits	5. interiorize criteria	• frontier for future exterior understanding created	scale of ambition expanded
	6. self fund	• side-effect benefits financially counted & budgeted	side-effect benefits quantified
	7. human scale	• re-centering around human not system scale	ergonomic reduction of system complexity of operation
	8. optimize	• systems optimized not single roles, functions, persons	inter-actions inter-relations optimized reducing chaos from non-combining individual excellences
Make Essentials Visible	9. clear waste	• self control boundaries and disciplines established	self management to reduce chaos of own self established as basis for later system management
	10. science method	• data replaces opinion based decision • public space created for word and deed sharing of genba (workforce)	complexity from impression-based deciding replaced by valid data basis; complexity of frustrated need to perform before others reduced by regular opportunity to perform
	11. remove hiding places	• inventories removed as hiding places for process slop	hidden complexity exposed by removal of traditional hiding places
	12. engineer processes	• find inter-process links, dependencies, enablements • distinguish work from enabling processes from enablement means change processes • automate process deployment	complexity of actual inter-process architecture laid bare and reduced
Organizational Inclusion	13. social leveling	• particularize tactics for different social levels	complexity of inconsistency among social levels reduced by tailored approaches for each level
	14. dissolve borders	• quantify and remove relictual structure blocks for flows	complex of structural excuses and traditions for poor process flows laid bare and removed
	15. market introjection	• bring market dynamics to interior structure components and their relations	use overt measurable complexity of market bidding systems to do things rather than endure hidden complexity from bureaucracies
	16. horizontal management	• focus careers on impacting exterior customers not bosses	adjust flow of human ambitions to match systems newly redesigned for horizontal impacts
Transparency	17. diversity aligned	• get all internal units pointing in common direction	reduce variation of direction among org units
	18. basic functions installed	• fractally implement most fundamental management functions	establish uniformity (non-complexity) by level of implementation of fundamental management functions
	19. invisibles made visible	• measure latent, interior, emotive components of impact	get systems to embrace emotive, subtle, nascent signals easily missed by formal, overt, rational systems--reduce complexity from missed non-rational dimensions operating unseen
	20. transparency to voices	• omni-directional undistorted transmission of requirements	reduce complexity of inconsistent transmission of messages in upward, downward, leftward, and rightward directions
Capability Invent	21. diversity leveraging	• pass diverse parties thru deployed processes, expand scope of doer	using complexity there in diverse parts of organization as input thru uniformly distributed processes and events to produce creative outcomes
	22. invent new competencies	• systematic development of capabilities shared across the organization	match customer requirements laid bare with development of new capabilities to reduce imbalance between new demands and ability to supply
	23. cognitive depth	• mental productivity expanded to scale of problems faced	using complexity there in diverse parts of human cognition via deploying uniform mental processes across varied workforce
	24. new basic unit of competing	• scale of unit that competes expanded to fit scale of problems faced	expand scale of doer to match scale of problem

Knowledge Deployment	25. re-engineering	• means by which functions are done updated in synch with capabilities the world develops	complexity of newly developed capabilities in the world input into company systems systematically as new substrates
	26. liquefaction	• distributing functions to faster, newer, more temporary means of delivery	reconfigurability of workforce increased so complexity of doer configuration matches complexity of form change of problems faced
	27. learning leverage	• quality of acquisition and use of knowledge measured and improved continuously	scale of learning increased to match scale of problems faced
	28. organization as theory	• everything set up and managed as experimental form not fixed right answer	commitments latent in form and function shortened and lightened so reconfigurability (complexity) of doer matches complexity of problems faced
Diversification	29. diversify diversity	• mapping of types of diversity there • measure how well each type is seen and used	precise accounting for amounts and types and degrees of diversity there to be leveraged, to fully leverage complexity latent in own diversities
	30. alternative delivery for management functions	• social class fixed inventory of "managers" replaced as default means of delivering managing functions • exact spec of what are functions of managing • exact measures of when and where what amount of what such function is needed	excess waste complexity of unneeded managing reduced and excess complexity from phenomena being unmanaged that need management reduced by precise accounting for amounts, types, and delivery means effectiveness for management functions
	31. software framing	• social and computer software linked as what is delivered • software specified via process fault root causes not "wanted" functions	new technologies forced to contribute in entire existing context instead of adding to complexity by becoming parallel universe of "special" rules
	32. movement globalization	• all above tactics applied to other forms of quality-- quality of earth, quality of conflict, etc.	entire tactical system reproduced to produce highly similar aims in very different contexts--vast expansion of tool set to match huge problem situation scope
New Commonsense	33. non-linear management	• linear statistics technique replaced by complexity theory technique	expansion of tool set basis to match scope of problems faced
	34. creativity competitiveness	• creativity dynamics studied and improved	expansion of complexity you can invent and leverage to challenge complexity thrown at you by situations
	35. biologic management	• new commonsense ventures established	entire context and framework of operation at all functions and levels switched radically to express new tool set basis above--expansion of doer complexity in capability to match situation complexity
	36. social & technical function virtualization	• models evolved into games into simulations into distributed net groupware • social forms of virtuality as well as internet forms and virtual workspace forms • computational sociality and software socialities	learning aids gradually evolved into becoming major tools of doing actual work--reducing complexity introduced by spec-ing and implement-ing new systems by growing aids into principals

Other Bodies of Knowledge to be Globalized Next--a Definition of Leadership

All the above globalizations have actually occurred and been experienced in the realm of 30 years of total quality movement work in businesses (and some governments and universities). They represent an entirely tested, largely proven, large-scale, global, practical approach that entire workforces and chains of companies are capable of mastering and applying in reasonable time periods at affordable costs.   They are ideas but also tested proven ideas.   They were all applied to one body of knowledge--quality knowledge--and used to expand, that is, globalize, it. Each of the above 36 globalizes quality attainment in distinct ways.   The question is, what body of knowledge, other than quality, might next best benefit from similar globalizations?

To answer that it helps to review why quality as

a body of knowledge was first chosen for totalization and then the above globalizations.   Japan was receptive, after World War II, to learning from Americans, including Feigenbaum, Juran, and even Deming.   There was an immense need in Japan for quality improvement. Japan took total quality tools and ideas from Americans and used them to make changes in Japanese culture of work--fixing excess personalism, excess emotionality, and excess hierarchy that Americans did not suffer as much from.   Twenty years later, well standardized, documented, and entooled quality methods, applied by hundreds of companies in Japan, helped Japanese firms invade foreign markets worldwide, terrifying their competition.   It was terror of this sudden onslaught of Japanese competition that motivated the global expansion of quality totalization and globalization methods.

The question, arises, then, what new body of knowledge now has the umpf, the motive power behind it that quality had with Japanese competition as the threat behind it?   If we find a body of knowledge amenable to the 36 globalizations above, but lacking an entire national economy victorious world wide in invading other markets as a motive force behind adoption of such globalizations, we can expect little actually to get done with it.   Without major motive force, the work of the above 36 globalizations is perhaps overwhelming.   Quality had such a motive force behind its adoption--what other body of knowledge today has an equivalent force behind it?

The internet as a kind of mirror world that all existing institutions must create equivalent forms in comes to mind.   The US is the nation pushing this threat worldwide into other markets.   Software security is perhaps another such global movement, driven by the force of the internet (driven by US threat in turn) and driven by the threat of spam and net-crime.   The juncture of nanotech, bioinformatics, and gene technology to form some kind of highly automatic generator of drugs, medicines just when industrial nation populations are tilting toward being aged dominated also comes to mind.   Here commercial possibility, driven by real increases in medical demand and ability to pay, are the drivers. Internet touching devices will usher in a huge new net-sexual-contact sub-industry, driven, like videotape cameras by the sex drive. Terrorism may drive the invention of ubiquitous camera surveillance and automatic person recognition systems--so that no place on earth is not seen, recorded, and scanned for suspicious activity.   Not all of these deserve serious consideration (net sex perhaps can be left unglobalized without harm).   Most, however, are real, important, and have enough driving force to make serious globalizations worth the effort perhaps.

How the Above Result Model Handles the Sources of Complexity Presented Earlier in this Paper

This paper started with a model of sources of complexity and traditional ways of reducing it.   Then a model of the history of development of the totalization (termed here "globalizations") of a body of knowledge was presented.   It was asserted there that that sequence of 36 types of globalization of the body of quality knowledge handled most of the sources and reducers of complexity in the first model.   Below I support this assertion, somewhat, by associating with each source and reducer of complexity the globalization type that clearly deals

with it.   This is not quantitative proof (getting such proof for just one of the 54 relationships shown below would entail an entire paper) but here presented as suggestive evidence of a qualitative sort (for later quantitative verification where that serves a purpose).   Careful examination of the content of each globalization and the content of the complexity source and reducer associated with it below will show strong, powerful, evident relevance between associated items, not vague, casual, sloppy, or inconsequential relations.

Which Globalizations of Any Body of Knowledge Reduce Which Complexity Sources

54 relations	**mental**	**social**

passive sources	shrink scope of what is **facing**
	    self built identity
	        22-new competency invention
	    value relativism
	        3-war on variation
	        4-promote customers
	        17-alignment
	    demystification
	        11-remove hiding places
	    futurization
	        25-re-engineering
	        31-software framing
	    ideological selfishness
	        26-liquefaction
	        33-non-linear management
	    fundamentalism
	        18-basic functions
	    fundamental limitations to human thought
	        28-organization as theory
	        8-minimax
	        10-science democratization
	        29-diversify diversity
	    civilization ally limited self knowledge
	        21-diversity leveraging
	    changes in commonsense
	        35-biologic management
		shrink scope of what is **facing**
		    specialization
		        1-movement of movements,
		        12-process engineering,
		        13-social leveling
		        16-de-vertical-ization
		        24-new bases of competing
		        32-movement globalization
		    descartization
		        2-stages of belief
		        5-evolving fitness
		        23-cognitive depth
		    technicization
		        7-human scale
		        19-visualization
		    sequestration
		        9-waste reduction
		        14-border dissolution
		        20-transparency to directional voices
		    commercialization of art
		        26-learning leverage
		    mass technology systems
		        21-social cleavage mobilization
		    marketization of values
		        6-self funding
		        15-market introjection
		    under and over development
		        30-management delivery alternatives

active sources	expand scope of what is **faced**:
	    non-linear system effects
	        34-competitiveness of creativity
	    diverse forms of social diversity
	        29-diversify diversity
	    new forms of computational system
	        36-function virtualization
		expand scope of what is **faced**:
		    non-linear system effects
		        34-competitiveness of creativity
		    diverse forms of social diversity
		        29-diversify diversity
		    new forms of computational system
		        36-function virtualization

reducers	shrink scope of what is **faced**; expand scope of what is **facing**
	    structural cognition
	        10-science democratized
	        23-cognitive depth
	    structural feeling (be to have)
	        19-visualization
	    simple programs
	        35-biologic management
	    adjacent beyond
	        35-biologic management
		shrink scope of what is **faced**; expand scope of what is **facing**
		    leadership
		        3-war on variation
		    organization
		        32-movement globalization
		    customer focus
		        4-promoting customers
		    creativity
		        34-creativity competitiveness
		    quality
		        24-new bases of competing
		    re-engineering
		        25-re-engineering
		    networking
		        36-function virtualization
		    geographic globalization
		        1-movement of movements
		    venturing
		        15-market interiorization
		        28-organization as theory
		    industrial combinatorics
		        26-structure liquefaction

The Call to Adventure as Finding and Extending Complexity

People and groups do not just suffer from complexity and reduce it, they also actively like and seek certain forms of it. The call to adventure in personal lives, literature, and careers is often a call from less complexity, risk, and discomfort, to more. People like to live on edge, at least a significant number of them do. It is through side-effects of these adventurers and their adventures that many of humanity's most important capabilities and inventions have arisen. Exploring complexity's most dense, concentrated, and dangerous locales appeals to some people and defines many forms of adventure. This area is treated in other work I have done on models of creativity, each model being a representation of one type of complexity that people choose to explore and challenge. I refer readers to that work rather than summarizing it here (Greene, 2003).

Conclusion

This research presented three models. One is a model of sources and reducers of complexity. Two is a model of 36 totalizations (called globalizations here) applied to one body of knowledge--quality knowledge--in the total quality movement's 30 year worldwide history. A version of this model with all quality references factored out is provided. Three is a model showing how each source and reducer of complexity is handled by one or more of the globalization types in that abstracted model. After that, other bodies of knowledge, the complexities of which might also be well handled by the same sequence of 36 types of globalization, are then suggested, based on what other bodies of knowledge have sufficient motive force to justify the extremes of effort, persistence, and complexity required to perform the 36 globalization types. Nothing is proved in this research, rather a huge scope of material is organized and framed to make a hypothesis, qualitatively supported with evidence that is only suggestive in this paper. My goal is to turn the entire history of evolution of quality totalization ("globalizations of one distinct body of knowledge") into a quite general tool that we can apply to other bodies of knowledge. This not only enlightens our view of what the total quality movement means and might mean, but it also greatly extends the scope of its possible application and importance in the future. Of course, I fully realize how much this kind of paper differs from the tightly focussed statistical testing of a few causal paths among six or eight variables found in most journal papers. I also realize, however, that publishing just more such narrowly focussed studies, eventually reduces interest and readership of journals. This paper, on the contrary, is a kind of large scale theorizing that helps frame dozens of research questions and generate dozens more. Seeing how the sequence of expansion of quality knowledge handling, found in the total quality movement, handles each of many sources and types of complexity, changes our understanding of why and how such movements evolve and what drives that evolution. It frames further exploration of such questions.

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