Complexity, Creativity, and Meaning in the age of Continuous Change

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Summary

Functional differentiation and specialization have influenced our ways of organizing institutions as diverse as factories and academic research facilities. This has led to an ever-greater level of fragmentation and has stripped our reality of meaning.
It is important to understand that our reality is constantly changing. The elements of success today may be the causes of failure tomorrow. We have to evolve as life itself does.
Meaning is natural and essential to life, even if our institutions don't support or cultivate meaning, it will grow nevertheless. Meaning will arise from new connections across boundaries and contexts; these are the dynamics of our world. Why not benefit from it?

> To be in a process of change is not an evil, any more than to be the product of change is a good.
> Marcus Aurelius, *Meditations*

1. Introduction

Philosophy has always held for me the promise of a total understanding of the universe, and I have, over the years, never allowed my discovery of all the complex and diverse theories that make up the study of philosophy to interfere with this ambitious albeit naïve conception. Science has taught me that the best models are models that are simple, and a good theory is in essence a simple one. These two realizations then are the inspiration behind the present writing. I hope to present what will appear to be counter intuitive yet simple ideas that will provide us with a broad understanding of the complex issues we face in our turbulent times. I hope that these simple models will give us an idea of where we are and how we can develop effective strategies that will get us to where we want to be.

We all seem to agree that we live in a time of rapid, even accelerated, change, where the pace of new developments increases daily, and there are no signs yet that we can expect a slackening of this trend. The future will bring ever more change over even shorter periods of time, and we need to make sense of it lest we run the risk of being swept away by the overwhelming dynamics of our world. We need simple powerful concepts to make sense of all the changes. The concepts I discus will help us gain, and sustain, competitive advantage in today's and tomorrow's world.

We will be looking at the increase in complexity of our knowledge systems, products and production processes, and develop some ideas about how to manage this increase effectively. We will be looking at a recurring paradox in many situations where the factors that lead to the success of a certain endeavor transform themselves into forces that undermine that very success. We will see how strengths can become weaknesses and vice versa. In the end we will try to construct a coherent image in which these developments will make sense.

The ideas we need exist, yet in reality we often find that benefiting from these ideas, and actually realizing the potential competitive advantage they imply, is a more difficult task. My conviction is that it helps to understand the big picture, and connect concepts to a larger context. If you want change to happen a clear vision is really the precondition for change to occur, this is true for both personal and organizational change. Embedding certain ideas in a larger context, not just organizational or managerial, but cultural and historical, helps to create a more lucid vision of the world. That then is the purpose of our current effort: providing a larger context, developing a broader perspective on what's going on, so that the vision will be clearer and more powerful. This will not only strengthen your own resolve, but will aid in communicating your ideas to other people. A clear vision is more easily

communicated and easier to share than a weak vision. Such a vision will not necessarily make decisions easier, but it will certainly aid the execution of your decisions, because you will be better able to convince others of the value of your choices. The world is not run by those who are right, but by those who can convince others that they are right. A clear vision helps you to act, and it helps other people to act.

In discussing matters in this larger context we will be going into areas other than those familiar to most of you when we deal with organizational change and management strategy. I will try not to digress too much, but I consider it essential to our endeavor to be touching upon philosophy, science and certain historical processes and facts, so that we can create as much of an integrated picture as possible.

2. Separation

2.1 Specialization in Industry

We will need a few important concepts in order to make our point. One of these is the notion of specialization. We will look at specialization as a historical process, and in particular as a historical process that produces a loss of meaning.

Specialization is a process implied by one of the driving forces behind our capitalist world system: division of labor. Division of labor is the idea that individuals specialize in a certain activity that has economic merit (makes them money), and these individuals acquire whatever other means they need to live through some mechanism of exchange (the market). Specialization within the production process amounts to a differentiation of the tasks that are involved in manufacturing a certain product, and can be seen as an essential precondition to our modern way of organizing activities.

The pre-industrial mode of production was different from the industrial mode in more than just scale. The skilled craftsman integrated many different functions in the process of manufacturing his products, from design and production to sales and marketing; being a craftsman involved the ability of mastering a number of different functions. These can all be seen as separate functions however, and the separation of them became the key to efficiency in mass production. Mass production is not a recent phenomenon and has been an aspect of the industrial age from its inception. Machines and factories have been used since the late 18th century to significantly increase production, but functional differentiation really opens up the door to our modern way of mass production. If you separate the different tasks involved in building the final product in terms of their function, you can perform each distinct task more efficiently. You can specialize your workforce easily, since each worker has to learn only one function, and it is easier to become efficient at it. Define the task in sufficient detail and you can have a machine do the work. In fact,

this development has proved so successful that the entire automotive industry today is almost completely mechanized.

Specialization in industrial production, through functional differentiation, is the force behind the assembly line production process invented by Henry Ford. This cost-cutting innovation redesigned the production process, and at the same time gave rise to a specific way of organizing the production unit: the modern factory. A mechanistic process design became the blueprint that determined the shape of the whole organization. The factory is a machine itself, which is to run like a machine, with interchangeable parts that can be either material or human. This is the Machine Mode of organization behind Ford's system of mass production.

Specialization in industrial production has given us an advance in process efficiency that led directly to the commoditizing of many products we now take for granted. It significantly reduced prices giving birth to the modern consumer and the riches of our consumer society. Specialization has benefited us in our access to products, even as it took the alienation Marx considered inherent to the industrial mode of production to a whole new level. We will return to this issue later.

2.1. Specialization in Science

If you look at the history of ideas in our western cultural hemisphere you will find there also a division of labor, and a related specialization of activities. Our modern way of conducting science has its origins in the Renaissance and developed through the period we call Enlightenment into the multitude of scientific disciplines we have today. The earliest scientists were not scientist at all; they were philosophers. Philosophers are people who seek insight and understanding about reality and the knowledge we have of reality, in the broadest sense. In this way philosophy can be viewed as the fundamental science, the mother of all other sciences. In the early days of our modern era there were no well-defined criteria with which to establish the acceptability of one theory over another, there was no notion of method that could be invoked to assert the legitimacy of a scientific discipline. Most scientific activities were rather speculative for a long time, and can therefore properly be called philosophy. Isaac Newton almost single handedly created the scientific discipline we now call physics, but he also dabbled in alchemy, and probably considered himself to be a philosopher more than anything else.

What has been happening, and what has been happening in an accelerated fashion over perhaps the last 200 years, is that various scientific disciplines that deal with some specific part of reality have emerged and established themselves as independent fields. Physics is the application of mathematical models to observable reality, and as such it was probably the first science to claim a position independent of philosophy. After the discovery of oxygen, chemistry becomes a science in its own right, studying the properties of elements and compounds, describing the processes by which one substance transforms into something else.

Most philosophers have written about society (Plato's *Republic*, Thomas Hobbes' *Leviathan* and J.S. Mill's *On Liberty*, stand out as formidable examples), but throughout the 19th century theorizing about various aspects of society lead to the separate disciplines of economics, sociology, anthropology and later linguistics: the "social sciences". Was Adam Smith the first proper economist, or was he still a political philosopher? What about Marx?

The point is that when we reach the 20th century we can legitimately assert that a number of new scientific disciplines have really become independent, and as time progresses they themselves have started to subdivide. In economics we now distinguish between macro-economics, econometrics, game-theory and so on; the social sciences have added ethnology and women studies to their sub disciplines, and in medical science we have witnessed the genesis of a veritable jungle of specialisms. Within each sub discipline successful results are produced. The new disciplines can in fact be seen as research programms focused on specific results, and we live of course in a culture in which specific results are things we consider to be quite valuable.

Across disciplines things are somewhat more problematic. Anthropologists and linguists don't necessarily agree on concepts relevant to both disciplines, historians and economists don't see eye to eye in all matters, and the first half of the 20th century produced a somewhat absurd situation in which the results of two subdivisions of the scientific discipline of physics, cosmology and quantum physics, are mutually incompatible. A problem that continues to dumbfound and haunt physicist the world over to this day.

Specialization can be observed in the history of philosophy as well. We have seen that as science has specialized more and more throughout the 20th century the same has been happening to philosophy. If you look at philosophy departments across the world, you see different branches of philosophy claiming their own independent right to exist. Philosophy itself has been as it were disintegrating into different disciplines, some of which don't even speak the same language and often disagree about the fundamental concepts they use. One branch of philosophy will question the very legitimacy of another. Where once philosophy was the great integrator of knowledge about the universe and ourselves, it has been subjected to the same change towards specialization that scientific disciplines have.

Specialization is a term I have been using to refer to a certain fragmentation in the way we organize systems that we use to create results that have benefited us in specific ways: cheap commodities, expanded knowledge. Division of labor, and specialization of manufacturing tasks through functional differentiation, have cut production cost and are responsible for the superiority of the industrial mode of production over others, at least in terms of cost and efficiency. Specialization in science has made it possible to expand the number of different fields of inquiry, while still pursuing in-depth knowledge into certain parts of reality. Specialization

has also produced less desirable consequences that are at the root of a significant challenge for the future.

3. Integration

3.1 Meaning

The concept of meaning is fairly new as a central focus in philosophy. If you look at the history of western thought you can say that initially philosophy was very much concerned with the things we now deal with in the physical sciences: understanding the universe, and understanding our relationship to it. Philosophy would examine reality, and attempt to derive statements about reality that are true, in addition to this philosophy would examine the way in which such statements are related to reality.

Questioning not just the nature of the universe but also the nature of knowledge about the universe, the focus shifted slowly towards epistemology (theory of knowledge). Immanuel Kant is the philosopher associated with the most comprehensive attempt at describing the nature of knowledge, in his endeavor to define, in a structured way, the conditions that make (scientific) knowledge possible.

Initially truth was a point of focus in philosophy, and the nature of reality the central issue. During the Renaissance and Enlightenment period, led by philosophers like Descartes and Kant, knowledge really became the center of philosophical inquiry, and not just within Europe's continental rationalist tradition. The empiricist tradition, almost exclusively associated with British philosophers like John Locke and David Hume, focused on knowledge as well. Empiricists are much more oriented towards the reality out there than the mind which perceives all of it, yet theories attempted to explain knowledge in terms of both factual and psychological aspects. Meaning was still a philosophical non-issue.

This changed towards the end of the 19th century. Gottlieb Frege, in his 1892 paper *Über Sinn und Bedeutung* (On Sense and Reference) is the person responsible for putting the concept of meaning on the philosophical agenda. In his paper Frege sketches a powerful first insight into what analytical philosophers now call meaning. *Sinn und Bedeutung* is about the relation between words and objects. Frege shows that the meaning of names cannot simply be reduced to the objects they refer to. This necessitated a distinction between the meaning of a word and the thing the word refers to. Frege's distinction became a hot topic for philosophers after him, and gave rise to a tradition we now call analytical philosophy. By focusing on meaning the central object of philosophical inquiry in this school became language.

LudwigWittgenstein pursued this direction and he became arguably the most influential analytical philosopher of the 20th century. He started out by examining the concept of meaning and its relationship to facts in an attempt to again reduce meaning to objects in the world and related truth values. A number of philosophers persisted in this idea that meaning can be reduced to referents, these are called

positivists. In the end Wittgenstein realized that this reduction ultimately fails. Reducing words to objects and meaning to facts cannot be successful, as Wittgenstein's *Tractatus Logico Philosophicus* in the end shows. Wittgenstein would write his *Philosophical Investigations* in order to explain the idea that meaning is related to the larger context of the language in which it exists: a community of speakers with a shared set of concepts, rules, and interpretations of reality. Frege's point was vindicated. Meaning is something words derive from a larger linguistic or cognitive context.

Another school of philosophy that has had a powerful impact on 20th century thinkers is a tradition that can be traced back to Edmund Husserl and is based on his phenomenology. Consciousness becomes the essential object of inquiry in phenomenology. Our consciousness is the great integrator of all objects and events that appear to us, all things are connected through the faculty that makes us aware of the world. Reality is a meaningful philosophical concept in as far as it is part of our consciousness, which Husserl referred to as the Transcendental Ego. Reality is in a way reduced to a marginal existence in the confines of our mind. One could argue that there is a risk of solipsism here, with no notion of an independently existing external world. Husserl however formulated the purpose behind his phenomenology as follows:

> Phenomenology does not deny the existence of the real world. Its sole task is to clarify the meaning of this world – the sense in which everyone accepts it, rightly, as really existing.

Husserl's most famous student, Martin Heidegger, was impressed with the idea of placing consciousness at the center of philosophical inquiry, and set out on the same path.

The study of consciousness is a rather abstract activity, and involves a paradox in its methodology: how are we to study consciousness if the means by which we do that is consciousness itself? Less concerned with the paradox than with the level of abstraction Heidegger decided to create a more concrete dimension to his inquiry. He would not study consciousness as such, but consciousness as it *exists* in the world, hereby giving phenomenology a more practical object of study and anticipating the term this direction of philosophy would soon be referred to: existentialism. In existentialism we see even more clearly how there is a practical aspect to meaning, since it is related to a consciousness faced with its actual existence. The social activism of philosophers like Sartre and Camus was a way to make life meaningful, related to Heidegger's emphasis on consciousness as it *exists in the world*. Heidegger's effort was to understand how consciousness is able to create meaning as it applies itself to the world around us. Consciousness is something one uses to make sense of things.

In order to pursue this effort, Heidegger deemed it necessary to invent a special language for the purpose of discussing the abstract notions involved, a move that incurred the wrath of analytical philosophers, who have never forgiven him for this bold move.

What we have been trying to do here is reconcile two distinct and antagonistic schools of 20th century philosophy by establishing the fact that they're both fundamentally concerned with meaning. They see meaning in similar fashion as something which emerges when you connect things to their context: words and sentences get meaning in their relationship to the rest of language, objects and perceptions get meaning as they enter the cognitive context of awareness. The meaning of separate events, the mentioning of a word, the apprehension of a perception, arises from the way it is connected to the larger context in which it exists: our language, our consciousness.
Meaning requires making connections, it involves coherence and integration, rather than reduction and separation.

3.2 The Crisis of Meaning

The great irony of 20th century philosophy is that it has discovered the concept of meaning to be of central importance while it has stood by passively as its own structure fragmented more and more into sub disciplines, each strongly divided over issues of legitimacy. Philosophy is no longer able to make sense of the complex changes taking place in society and the academic world alike. To analytical philosophy meaning relates to the use of language, to existentialist (phenomenologist) philosophy meaning relates to consciousness. As the 20th century drew to a close these two areas of philosophical inquiry were themselves being colonized by new cross-disciplinary scientific fields like cognitive psychology and computational linguistics.

It is no surprise that postmodernism has been the last significant development in 20th century philosophy. Postmodernism itself is little more than the realization that philosophy has lost its great unifying narrative, and has ceased to make sense of it all. A last desperate sigh of philosophical impotence, today even postmodernism seems to have run out of steam.

We have seen how throughout the last century we have created in accelerated fashion an enormous set of academic disciplines with little overall coherence.

Capitalism in combination with industrialism, through its efficiency in production, has given us unprecedented wealth while alienating us from the intrinsic meaning of work.

Individualism has given us protection against arbitrary institutional violence – freedom, while alienating us from each other.

Mass media have created a global village and a barrage of marketing incentives, while alienating us from our own ability to think for ourselves and trust our own judgment.

Materialism and reductionism have led to the great technological advances of the 20th century while alienating us from a feeling of being connected to nature.

The revolution in information technology has given us more information about more subjects available to more people then even before, yet we hardly seem to be able to make better choices on the basis of what we know.

Where do we find ourselves then?

Mass production in combination with product diversification has produced an amount of choice in our daily lives that we have never enjoyed before. The ability, or necessity in fact, to choose between all these products has, in combination with the general loss of meaning in our lives, produced a strange paradox.

We have the affluence to buy a fine array of state of the art products, but we need advertisement to tell us what to buy and why. We subject ourselves to manipulation in order to 'discover' what we need.

We are informed about the events that affect the poorer inhabitants of our global village, yet we feel powerless to act. It makes us feel not involved but frustrated, not compassionate but disillusioned.

We have the democratic freedom and financial means to pursue whatever desire we have, but we have forgotten what we really want in life.

We have a society that is becoming more and more dependent on technology, yet technology is an unpopular choice of career.

The specialization, separation, fragmentation, and lack of integration that are a structural part of our way of organizing complex processes have left us with an overwhelming lack of connection to our context and to each other: a crisis of meaning

How do we react to this situation? What is the scope for solutions? What will the future bring?

4. The Changing Game of Competition

> ... the act of playing a game successfully changes the game itself. Failure to appreciate the consequences of one's success and tenacity in playing the good old game are what tragedies are made of.
> Jamshid Garajedaghi, *Systems Thinking*

When we do business we try to exploit our own competitive advantage in order to increase our profits. In this section we will be looking at how competitive games have changed and evolved over the 20th century. The reason I call them competitive games is because they are structured forms of behavior involving rules, even though some of these may be unwritten, and success is a matter of choosing the right strategy. A different game will be defined by different rules, and success will by definition be determined by a different strategy. No matter how competent and motivated you are, you will never be able to win playing according to the rules of baseball on a tennis court.

Henry Ford, by radically improving his production process, excelled at the competitive game of mass production. With a machine mode of organization, he was able to truly mass-produce at very low cost. As he was achieving his success the competitive game he was involved in itself became transformed. Production was no longer a challenge, demand became the issue that required attention. To whom are you going to sell your cheaply produced commodities? Ford had his own answer to this question: he raised the standard of living of his workers, and by doing so he was able to create the market he needed. He came up with an answer the question without changing his mode of production or his organizational structure, without changing the game he was playing. Failure to do this undermined his success in the new game that was emerging. People wanted affordable cars, but they wanted them in different colors and shapes. The success of mass production created the possibility for ordinary citizens to own scarce and expensive items, formerly produced by craftsman. This transformed American society during the 20th century, and the rest of the world is likewise affected. Diversification of products became a new factor in the success of companies, and provided you could deliver diverse products at a sufficiently low price, your market was virtually endless. Advertising your product became a way of creating a market for it. The new game, aimed at market growth, became the game of Mass Marketing.

The rigidity of the assembly line production process, key to the efficiency achieved by Ford and his success at playing the game of Mass Production, became a weakness in the new game since it could not facilitate any product diversity. In the same way the factory, conceived of as a giant machine, was ill equipped for growth implied by the mass commodification of products. The factors that defined Ford's success, a Machine Mode of organization and a rigidly efficient production process, undermined that very success in the new context.

In order to deal with the demand for product diversity and the growth of commodity markets that were aspects of the new game, an new organizational paradigm was needed. From this need arose the current industrial organizational model: a corporate office (the brain of the company) distinct from the operational organization, the whole designed as a divisional structure, subdivided in business units, managed from the top down with a focus on growth and a strategy of mass marketing. The new paradigm was able to offer a diversity of products still within the framework of centrally organized mass production (marketing) units. This

organizational paradigm became the hallmark of the competitive game of Mass Marketing.

The era of Mass Marketing led to an ever fiercer competition in the dimension of product diversification, to the degree that today many 'different' or 'improved' products are so only in name. The expansion of the game of Mass Marketing, with its (fictional) product diversification, had another consequence however: consumer expectations changed. Consumers have started to expect more and more of the products and services they buy. Consumers have been spoiled, and demand ever more control over the things they pay for. Mass marketed commodities, in combination with the spread of a culture of individualism, have increased a desire for uniqueness, and the ubiquity of a world of commodities has paradoxically made mass produced items into objects people use to define their authenticity as unique individuals. These developments are bringing us closer to a new competitive game, one we refer to as Mass Customization.

Many expect the new game of mass customization to dominate market dynamics in the near future. We can safely assume that the new paradigm will again undermine, at least some of, the factors that contributed to the success of the old competitive game of Mass Marketing.

One can argue that the new game is not yet here. Many instances of "mass customization" have to do not so much with a real strategy of customization but of increasing the choices on offer, i.e. an extension of product diversification, i.e. a continuation of the old game.

Mass customization requires true flexibility in at least part of your production process, you will have to redesign your process, and be able to do so continuously. This will have consequences for your organizational paradigm, since process flexibility is not something that can be managed from the top down. Some kind of integration across the different parts of the process needs to take place, and this integration needs to happen at the operational level, as close to the process as possible. In addition to this you need transparency in your process in order to determine the prize of customization among other things.

Most products today are not manufactured by a single company. This is especially true for the products of our technological (ICT) revolution. We purchase the product from a single company, but that really is the organization that has assembled all relevant components and services into a single entity. The manufacturing is done by a conglomerate of companies who all contribute their own specialism to the total product creating what Clayton Christensen calls *Value Networks*. A value network is the context within which components, and component manufacturers, achieve their value. With products having become essentially assemblies of components produced by specialized companies, Mass Customization produces an added dimension of complexity. A flexible production process in the context of a Value Network requires the same integration and transparency, but this time between companies. Ability to integrate information and processes would seem to be a quality essential in playing the game of Mass Customization.

Mass Production and Mass Marketing are both activities that are compatible with a culture of specialization. The crisis of meaning has shown that there is a limit to the amount of specialization and fragmentation you can allow to happen, with no coherence and meaning left the system as a whole starts to suffer. One aspect of the new competitive game of Mass Customization seems to be that it favors integration.

5. Conclusion: Strategies for Creating Meaning

We have seen how specialization is related to what I referred to as a crisis of meaning. Not only have we lost the ability to see the big picture, we have seen how the information technology revolution has transformed our business and academic environment, and is still not compatible with what we really need.
The enthusiasm with which a change is received in a certain context is exacerbated by the degree of absence of anything resembling the change. Rain is most appreciated in the driest desert. Cross-disciplinary efforts to integrate knowledge are important. Whether of strategic value to you or not, whether you planned to do it or not, such endeavors create meaning, and there is value there.

We have seen how successfully playing one kind of competitive game undermines the ability to be successful in the context of the next. Confronted with shifting paradigms and with traditional structures that undermine the creation of meaningful connections and thus understanding, we need new forms, new structures, new systems to help us shape our future.

So what is being suggested here? Should we start breaking down all known barriers, and transform our organizations in a radical way? Do we need to rethink everything about the way we organize systems like companies or research departments? Apart from the stunning magnitude of such a challenge I believe it is quite unnecessary. We can achieve a lot of integration and create meaningful cross-boundary connections in the virtual domain of information, this would require only a minimum of intervention in the mortar-and-brick world,

In our discussion of philosophy we have seen that philosophers, despite their proclivity for dispute, largely agree that meaning is the fabric of our language as well as the fabric of consciousness. We live in a historical era where meaning is an issue of concern, and a need for it exists. It is a scarce item: there is a real market for meaning. In order to create meaning we need only to redesign the virtual world.

Redirecting our information flows and connecting information domains would go a long way towards achieving what we need. Integration of knowledge is really what information technology is all about anyway. If information is digital, it can be compared, accumulated, analyzed, categorized, multiplied, sent, received, cross-referenced and indexed in cheap and straightforward ways. The potential for meaningful connections and structures to arise only increases with the size and dynamics of the knowledge domain and the number of knowledge fields involved.

Semantic Web Technology is a recent innovation that will help us navigate the increased complexities of multi-disciplinary knowledge domain integration.

Creating new virtual connections is particularly powerful if different contexts are involved. A context defines what features of an entity will be most valuable; this is the idea behind the Value Network we discussed earlier. Principle centered innovation methods like TRIZ are an example of how to reorganize the virtual world in a way that facilitates this re-contextualization. Patents are related to contexts, but may contain ideas that can provide powerful solutions in a different context. Re-arranging existing ideas are often the material inventions are made of.

When an American team of researchers and engineers, after an arduous effort, finally came up with a workable prototype of the transistor around 1947, thus solving a longstanding problem in electromagnetic engineering, the context of application chosen by US manufacturers was military. The real revolution we associate with the transistor today was created by the Japanese when they started to mass-produce the (SONY) transistor radio. The success came with the application to a certain context (portable radios) not with the technology itself. If you want to be successful, don't invent the wheel, contextualize it!

Unexpected or unanticipated combinations between existing products can be another way that recombinations across boundaries leads to meaning and hence success. The phone-camera combination that seems to be the new success in telecommunication gadgets is a good example. Photography and telecommunications were completely different domains, yet as we speak consumers are inventing ways to benefit from the new functionality they have been provided with: the idea makes sense to them.

Real life challenges create new fields of research with cross-disciplinary informational needs. New directions in research are defined on the level of operations, not necessarily in accordance with the taxonomy of academic disciplines. These cross-disciplinary research efforts are the proto-sciences of the future. We can see examples in fields such as psychoneuroimmunology (studying the effects of well-being on physical health) and bioelectromagnetism (studying the relation between regeneration, e.g. bone fracture healing, and low voltage direct current). We can also see very promising new directions in engineering happening that show the effectiveness of cross-discipline knowledge development: bio mimicry. (where would engineers be without mother nature?). In this field there is room for a lot of disciplines to share knowledge and construct new innovations. This his already led to powerful innovations in aerodynamics, cooling technology, waste management, and agriculture.

New meaning is created as a combination across different domains, but this process is not random. Meaning is related to purpose. Life itself is an example: it arises out of complex combinations of unrelated elements and processes with a definite purpose: diversification and survival. Purpose gives a direction to the, chaotic - but not random, recombination of elements that can lead to success: a viable innovation that possesses strength and durability. We want the same in our

products as we observe in nature. Even if we fail to transform our institutions in ways that facilitate better the creation of meaning, the process whereby meaning is created is taking place. A favorite example of mine is Wangari Maathai's *Green Belt Movement*. This movement is a grassroots citizen's initiative to preserve nature, and empower citizens to do so. It has grown over the 30 or so years of its existence, all from the power of its purpose. Maathai's movement is an example of self-empowerment as an answer to the crisis of meaning. Her 2004 Nobel peace price is a welcome institutional reward for such spontaneous purpose driven instances of self-organization.

Meaningful combinations, meaning, are likely to happen across current institutional and conceptual boundaries. In that sense our cultural tradition is an obstacle to innovation and progress. At the same time, the coming into being of these connections and combinations are natural, it is the way in which Nature's powerful creativity manifests itself.

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