

SECTION TWO

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Chapter Five

Human nature and social networks

Introduction

This chapter argues that a variety of scientific discoveries are radically changing our understanding of human nature and that they offer new approaches to achieving effective command and control within edge organizations.

Different models of organization vary in their assumptions about how people are motivated to work together for a common purpose. To characterize the alternatives in the extreme, in one camp there is the “Hobbesian” view that people are primarily motivated through a combination of fear and self-interest. According to this view, the challenge of effective command is to align the enlightened self-interest of individuals with the overall goals of an organization. For these “social realists,” human beings are not naturally trustworthy, but will “defect” to act on their own behalf unless appropriately monitored by authorities with special powers. This group sees hierarchical controls as a natural, necessary, and efficient means for achieving order, clarity, and accountability. In the opposing camp are the “social idealists” who argue that it is inherent in human nature to trust, to help one another, and to act for the common good. This group contends that hierarchy is not a prerequisite for effective control and that given the proper conditions, individuals will naturally act for a common good. Whereas this point of view is often dismissed as utopian, it is nonetheless one of the primary values of highly effective combat groups¹ and is found to be the principle motivator behind highly respected leaders in all sectors of society.²

The position taken here, however, is not to oscillate between these two extremes, but attempt to identify the rationale for why some models of social organization are more effective than others under varying social circumstances. Fortunately, there is a growing body of research that is beginning to identify a repertoire of both innate and learned

¹ See: Rinaldo, Lt. Col. Richard J. “Combat.” *Army Magazine*. July 2003.

² George, Bill. *Authentic Leadership: Rediscovering the Secrets to Creating Lasting Value*. San Francisco, CA: Jossey Bass. 2003.

social strategies that human beings used to build trust, identify “cheaters,” and cooperate within and across groups. Some of these are hierarchical in nature, others are peer-based, cooperative, and trust-based. In either case, it depends upon the context and the nature of the group task.

Human sociality as an evolutionary stable strategy (ESS)

A steady stream of research from the complexity sciences, evolutionary psychology, biology, and neuroscience are providing a new and detailed understanding of human nature. No longer a source of armchair speculation, today’s understanding of human nature is becoming a precise experimental science, drawing upon many rigorous disciplines. Not only are these findings overturning many strongly held myths about human rationality and motivation, but they are also helping us to understand how spontaneous forms of human organization emerge and how large-scale, self-synchronizing organizations might be more effectively controlled.

One thing that the biological sciences are demonstrating is the extent that human beings are genetically linked to virtually all forms of life. Not only do we share 98 percent of our genetic code with our closest cousin, the chimpanzee, but also 46 percent of our genetic code with mice.³ What is no less extraordinary is the extent to which human social behaviors are very similar to other social species—even those to whom we are not genetically linked.⁴ How is it that very similar cooperative strategies and social behaviors emerge in genetically distinct species? The answer is intriguing because it argues that under certain environmental conditions, there are Evolutionarily Stable Strategies (ESSs) that are independently discovered by different species and embedded in their respective genomes through the trial and error of thousands of generations of evolutionary testing.⁵ What this means is that for certain forms of cooperative behavior there are ESSs that naturally appear as the best solutions and that these are present in a variety of different social species: harvester ants, ravens, wolves, elephants, whales, boobos, chimpanzees,

3 Healey, Justin ed. “Issues in Society.” *Genetics*. Volume 149. 2001.

4 Gaulin and McBurney. “Social Behavior.” *Psychology: An Evolutionary Approach*. Upper Saddle River, NJ: Prentice Hall. 2000.

5 An evolutionary stable strategy (ESS) is a circumstance of a species where there is no incentive for any other strategy to displace them, because this the best that a species can do given the circumstance.

and human beings. Therefore, one can argue that there are certain underlying laws—a kind of social physics—that can be abstracted for complex forms of collective behavior and cooperation, independent of the kind of species involved. Indeed, understanding what these laws might be has been the focus of research in evolutionary game theory, multi-agent simulations, and models of artificial life. The fact that highly stable strategies of collective behavior emerge over time indicates that highly fit organizations would benefit from such strategies as well.⁶

But that is only part of the picture. Human beings are unique in evolutionary history in having discovered certain survival ESSs that no other species has obtained. Therefore, it is not only important to understand how we are behaviorally similar to many other social species with similar social survival strategies, but also how we are uniquely different. Although the architecture and functionality of the human brain and limbic systems are similar to their reptilian, mammalian, and primate ancestors, there are new additions in the form of a neo-cortex, which is unique in its size and functionality. Although the human brain is composed of a large, ancient “legacy” system, which like software code is patched one layer upon another without any apparent design, it is this new layer that enables a very powerful and species-specific capability.

For many years, anthropologists argued that what made human beings unique was their ability to make tools, with some anthropologists even going so far as to argue that *Homo sapiens* should more correctly be renamed *Homo Fabens*, the tool maker. More recently, it has been argued that it was the “language instinct,” a human being’s innate and unique ability to create language systems that differentiate us from all other species. Yet, as more and more research became available on the linguistic abilities of other species, especially primates, there seemed to be no definitive point dividing human linguistic or communicative abilities from those of other primates.⁷

Now evolutionary psychologists and anthropologists offer a new explanation of the “human difference” that takes into account language creation, tool making, and social

⁶ This is an example of what is known as *convergent evolution*.

⁷ Dunbar, Robin. *Grooming, Gossip, and the Evolution of Language*. Cambridge, MA: Harvard University Press. 1996. p. 66.

cooperation. For the last 50 years, evolutionary theory was confined by a set of theoretical blinders that looked at fitness selection only on the individual level and contended that the individual was the only unit of selection. In contrast to Darwin's original writings, these scientists contended that there was no selection for group traits. Now that point of view is in dispute with many evolutionary biologists arguing that natural selection does function at the group level and the evolutionary success of *Homo sapiens* can in large measure be attributed to its ability to manage complex social relationships. In other words, the ability of different species to function cooperatively has tremendous survival value. Those that manage the most complex and flexible forms of social cooperation enjoy a reproductive advantage. Hence, group cooperation was a vector of natural selection for these species, including primates and our ancestors, the hominids.

Robin Dunbar and his colleagues conducted a study of the fossil record of the brain sizes of hominids that showed that the size of the neo-cortex—the part of the brain concerned with thinking and problem solving—increased with the size of the hominid social groups. He argued that the ability to coordinate behaviors and manage relationships in groups was so important that it accounted for the growth of the neo-cortex not only in primates, but other mammals as well.

All of our analyses so far had been built on the assumption that the problem each animal has to face is keeping track of the constantly changing social world of which it is a part. It needs to know who is in and who is out, and who is friends with whom, who is the best ally of the day. In the social turmoil, these things were in a permanent state of flux, changing almost day-by-day. The animal has to keep track of all these, constantly updating its social map with each day's new observations.

But there are other possibilities. One is that the relationship between the neo-cortex size and the group size actually has more to do with the quality of the relationships involved rather than their quantity. This much is implied by the Machiavellian hypothesis itself, which suggested that the key to understanding brain size evolution in primates lies in the use primates make of their knowledge of other animals.⁸

⁸ Ibid, p. 66.

It is interesting to note that given the evolutionary significance of managing the quality of social relationships, it is only natural that human beings would evolve reputation rating systems for large-scale digital communities. According to Dunbar's analysis of the human neo-cortex, he predicted that the upper limit on the number of different relationships that people can manage is between 150 and 200. Indeed, the sociological literature seems to bear out his predictions. For example, groups as diverse as the Hutterites, Mormons, Anglican Church, military units, and Australian Aboriginal clans all set an upper limit to their group size at around 150 members. Social groupings above 150-200 members become hierarchical in structure, whereas smaller groups rely upon personal contacts. According to Dunbar, most businesses seem to obey the 150-200 rule.

Businesses with fewer than 150-200 people can be organized on entirely informal lines, relying on personal contacts between employees to ensure the proper exchange of information. But larger businesses require formal management structures to channel contracts and ensure that each employee knows what he or she is responsible for and whom they should report to.⁹

As Rob Cross and Nitin Nohria have shown in their analysis of informal social networks within businesses, the problem with many formal and *impersonal* reporting structures in large organizations is that they are not transparent and are not trusted. Hence, much of the real work within large enterprises is still conducted through informal networks.¹⁰ This is not surprising if people are wired to coordinate their behaviors through social protocols that are essentially innate. There is growing neurological and experimental evidence that not only are the brains of human beings indeed wired for reciprocal exchange, but that many of the emotions associated with governing social behavior—shame, pride, anger, guilt, compassion—are also biologically based and characteristic of most mammalian social species, including wolves and vampire bats!¹¹

Altruism, for example, is not limited to human beings, but is typical of many different social species. Experiments with rhesus monkeys have shown that they would refrain from pulling a chain to deliver food if it would result in shocking other monkeys. This

⁹ Ibid, p. 72.

¹⁰ Cross, Rob, and Nitin Nohria. "Six Myths about Informal Networks: How to Overcome Them." *MIT Sloan Management Review*. Spring 2002.

¹¹ Damasio, Antonio. *Looking for Spinoza, Joy, Sorrow and the Feeling Brain*. Orlando, FL: Harcourt. 2003. p. 160.

suggests that empathy and reciprocity are not merely ideals, but rather ESSs that seem to be the encoded behaviors of many species. The highly respected neuroscientist Antonio Damasio has argued that social emotions have an identifiable physiology and measurable role in the behavior of the human brain. “Anger, fear, shame, indignation, jealousy, pride, compassion, gratitude, sorrow and joy appear to be part of an overall program of bio-regulation.”¹²

Leda Cosmides and John Tooby are among a growing number of evolutionary sociologists and psychologists who have argued that social exchange algorithms are the innate competencies that enable human collectivities to function as communities.¹³ Such algorithms include a person’s sense of justice and guilt, social reciprocity, gift giving, and an ability to interpret social cues. Sometimes called *reciprocal altruism*,¹⁴ it is an adaptive trait because it benefits the collective.

This mutual provisioning of benefits, each conditional on the others’ compliance, is rare in the animal kingdom “Social exchange cannot be generated by a simple general learning mechanism, such as classical or operant conditioning.... This strongly suggests that engaging in social exchange requires specific cognitive machinery, which some species have and others lack.”¹⁵

This same point is echoed by Dunbar in discussing brain evolution when he argues that the “mind doesn’t work like an all-purpose computer” but rather “consists of a number of separate modules, each designed to do a particular task.”¹⁶

One other compelling bit of evidence that social exchange is a universal trait for all human societies is a study that compared the ability to detect deceit among Harvard undergraduates and the Shiwiar, an isolated Amazonian tribe of hunter-horticulturalists.¹⁷ If the ability to identify cheating were the product of culture or economic development, clear differences in this competence would be discernible. But the study found that

12 Ibid.

13 Cosmides, Leda and John Tooby. *Evolutionary Psychology: A Primer*. Center for Evolutionary Psychology. Santa Barbara, CA: University of CA. 2002.

14 Axelrod, R. and Hamilton W.D. “The Evolution of Cooperation.” *Science*. 1981. p. 211.

Trivers, R. “The Evolution of Reciprocal Altruism.” *Quarterly Journal of Biology*. 46:35–57. 1971.

15 Sugiyama, Tooby, and Cosmides. “Cross-Cultural Evidence of Cognitive Adaptations for Social Exchange among the Shiwiar of Ecuadorian Amazonia.” PNAS. #3529.

16 Dunbar, *Grooming*. p. 61.

17 Ibid.

“cheater detection reasoning” was present in all of the developed and developing countries included in the study.

This is significant because cheater detection—along with our ability to recognize facial expressions, intentions and emotions, our ability to make friends, our sense of loyalty and protectiveness, our ability to detect injustice, calculate our own self-interests, create a new language, etc.—are highly specialized brain functions, not general-purpose capacities. When the regions of the brain that carry out these functions are injured, no other competencies are impeded, only these highly specific capabilities.¹⁸

This suggests that our specialized cognitive instincts for enacting social exchange are deeply rooted products of natural selection. The evidence from hunter-gatherer archaeology is that hominids have carried on social exchange for at least two million years. The history of cultures shows that social exchange is universally human and not a recent cultural invention.¹⁹

Mirror neurons

The ability to coordinate actions and infer mutual intentions may not just be due to effective communications, but our having evolved equivalent brain circuitry, in effect, being of a common mind. According to the cognitive linguist George Lakoff,

we know from psychology professor Paul Ekman’s research that configurations of facial muscles express certain emotions. Presumably, our mirror neurons fire when we see the same configurations of facial muscles on someone else that our facial muscles would make. And that firing can activate our own emotional centers. In short, that allows us to empathize—to feel someone else’s pain or joy... We have evolved to be empathetic (via mirror neurons and connections to the emotional centers of the brain) and to be connected to the world (via canonical

¹⁸ “Humans evolved cheat detection as a separate mental component, says evolutionary psychologist John Tooby of the University of California, Santa Barbara. “Our brains have specialized programs like computer programs, specific for various applications,” he says. Powell, Kendall. “Brains sniff out scam artists: Evolution might have programmed us to compute fairness.” *Nature*. August 13, 2002. <http://www.nature.com/nsu/020812/020812-1.html> (June 2004)

Also see: Young, Emma. “Brain’s ‘cheat detector’ is revealed.” *New Scientist*. August 12, 2002. <http://www.newscientist.com/news/news.jsp?id=ns99992663> (June 2004)

¹⁹ Dunbar, Robin, Chris Knight, and Camilla Power. *The Evolution of Culture*. New Brunswick, NJ: Rutgers University Press. 1999.

neurons). Empathy and connection to the other and to the physical environment are central aspects of human nature!²⁰

Arguing whether human social exchange behavior is selfish or altruistic misses the point.²¹ We behave the way we do because it has survival value. The neuroscientist Damasio makes this point:

The biological reality of self-preservation leads to virtue because in our inalienable need to maintain ourselves we must, of necessity, help preserve others. If we fail to do so, we perish and are thus violating the foundational principle, and relinquishing the virtue that lies in self-preservation. The secondary foundation of virtue then is the reality of a social structure and the presence of other living organisms in a complex system of interdependence with our own organism.²²

But the unique human evolutionary trait is not just a highly proficient form of social organization or the ability to manage complex social relationships. It is also the capacity to symbolize, that is, construct new systems of meaning out of arbitrary tags, thereby separating the representation of a thing from the thing itself.²³ In other words, people construct highly malleable models of reality and experience that they can communicate and share with others.²⁴ Rather than being the artifact of an inherent language instinct, which Steven Pinker²⁵ and Noam Chomsky²⁶ have argued, language probably began as a social coordination capability, a kind of rudimentary “handshaking protocol” that enabled multiple participants to create conventions for sharing information and coordinating their behaviors. Whereas many computational and generative linguists have treated language as a logical system for transmitting “well formed propositions,” in effect, what is called its *depth structure*, the great bulk of linguistic apparatus—words, prosody, voice, modals, deixis, discourse, and thematic devices—are concerned with expressing social roles and

20 Personal correspondence from George Lakoff. 2003.

21 There is debate between those who espouse the “selfish gene” model of Richard Dawkins (*Selfish Gene*, Oxford University Press, 1976) and those who take the cooperative or altruistic view of evolution (Sober, Eliot and David Sloan Wilson. *Unto Others: The Evolution and Psychology of Unselfish Behavior*. Cambridge, MA: Harvard University Press. 1998.)

22 Damasio, *Looking for Spinoza*. p. 161.

23 Clippinger, John H. *Biology of Business: Decoding Natural Laws of Enterprise*. San Francisco, CA: Jossey Bass. 1999.

24 Deacon, Terence. *The Symbolic Species: The Coevolution of Language and the Brain*. New York, NY: Norton. 1997.

25 Pinker, Steven. *The Language Instinct*. New York, NY: HarperCollins. 1994.

26 Chomsky, Noam. *New Horizons in the Study of Language and the Mind*. Cambridge, MA: Cambridge University Press. 2000.

relationships through variations in “surface structure.” This is a fact not lost on Dunbar in analysis of the evolution of language:

We do seem to use language in establishing and servicing our relationships. Could it be that language evolved as a kind of vocal grooming to allow us to bond larger groups than was possible using the conventional primate mechanism of physical grooming? ...If conversation serves the same function as grooming, then modern humans can at least “groom” with several others simultaneously. A second is that language allows us to exchange information over a wider network of individuals that is possible for monkeys and apes. If the main function of grooming for monkeys and apes is to build up trust and personal knowledge of allies, then language has an added advantage. It allows you to say a great deal about yourself, your likes and dislikes, the kind of person you are; it also allows you to convey numerous subtle ways something about your reliability as a friend and ally.²⁷

Sociality and command and control

It is important at this point to relate the prior discussion to the fundamental concern of this book: how do you have effective and accountable command and control in a distributed, networked organization? In practical terms, how do you control something over which you do not have direct authority? The findings summarized in this chapter show that humans have evolved as a social species and have consequently developed highly sophisticated social signaling and enforcement mechanisms that reward and enforce complex forms of cooperative behaviors. The implications for command and control structures are profound. Instead of having to impose such cooperative mechanisms from above or through formal monitoring and intervention processes, highly sophisticated cooperative behaviors can be evoked by creating a context in which the appropriate social signaling takes place. Once given the appropriate signals and rules, groups can spontaneously self-organize and control themselves. Moreover, as presented in Chapters Six and Seven, there is evidence that people self-select to identify a social network role to accomplish critical tasks and preserve the integrity of the group. As the behavioral economist Paul Zak²⁸ has shown in a number of his experiments on trust, subjects do not act to maximize their own self-interest as would be predicted by classic economic theory (the social realist), but engage in trust-building behaviors to develop cooperative strategies. Such strategies for forming self-synchronizing groups have

²⁷ Dunbar, *Grooming*. p. 78.

²⁸ Zak, Paul. “Trust.” Capco Institute. *Journal of Financial Transformation*. pp. 17-23.

survived because they have been shown to have enormous survival value. Indeed they are not utopian, but highly pragmatic in ensuring group or species survival.

Language and symbolization

Many social species have assessment protocols for evaluating the threat of a predator, the strength of a competitor, or the health of a potential mate. In this respect, human beings are no different in using assessment protocols to assess risks and opportunities. However, human beings are unique among all species in that we can construct new and arbitrarily complex conventions for mediating and coordinating interactions between members of large groups. What separates humans from all other animals is an ability to extract a symbolic representation from a set of physical interactions and then give this symbolic representation its own social reality that can direct and orient behaviors independent of the physical objects or actions that gave rise to it in the first place. This is what the noted philosopher and linguist John Searle sees as the critical function of language: the competency to arbitrarily construct what he calls *social* and *institutional* realities out of social and institutional facts. He contrasts “brute facts,” such as the fact that the earth is 93 million miles from the sun, from “institutional facts,” the fact that I am a citizen of the United States.

Social facts are any facts involving two or more agents who have what he calls collective intentionality, such as animals hunting together, birds cooperating in building a nest, and presumably so-called social insects such as ants and bees, manifest collective intentional and have social facts...Human beings have a remarkable ability that enables them to get beyond mere social facts to institutional facts. Humans engage in more than just sheer physical cooperation; they also talk together, own property, get married, form governments, and so on.²⁹

In order to illustrate his point about how institutional facts and realities arise out of linguistic abilities to symbolize human interactions, Searle cites the example of money. He argues that, originally, currency entailed the negotiated exchange of objects of inherent comparable value—a barter system that was wedded to the inherent value of the physical object. The second kind of money was “contract money,” which consists of contracts to pay the bearer with something valuable on demand. This entailed the

²⁹ Searle, John. *Mind, Language, and Society*. New York, NY: Basic Books. 1998. p. 121.

exchange of valuable commodities such as gold and silver whose value was more *imposed*, to use Searle's term, than intrinsic. Instead of exchanging objects that were highly cumbersome and whose comparable values were tedious to compute and benchmark, precious coins representing the value of the objects were used. And then, as the transport of these coins became cumbersome, another layer of abstraction was added, paper currency, which was a contract to redeem the face value of the paper currency with a tangible, precious metal. Next, "fiat currency" emerged, another invention of convenience and efficiency. This unit of exchange was not redeemable, but simply declared by an issuing body to be a currency. Just recently, there has been a further innovation in efficiency and convenience, the further abstraction and virtualization of money: digital currency, which is no more than 0 and 1 substitution symbols about the status of the relationship between agents to a transaction. Here, no physical object has to be redeemed at all, as the "social reality" is captured in the digital representation.

Language and social institutions

Both philosopher John Searle and anthropologist Terrence Deacon contend that this unique human ability to construct social realities that result in highly sophisticated institutions is based upon some relatively simple rules. Consistent with the arguments made by John Holland, Stuart Kauffman, Stephan Wolfram,³⁰ and other major figures in the complexity sciences, highly complex behaviors can come from the repeated application of simple rules. According to Searle, the rule "X counts as Y in C" (where X or Y can be any thing or proposition and C is a marked context) cannot only account for the evolution of money from a tangible currency to a fiat currency, but also for the creation of "institutional structures such as governments, armies, universities, banks, and so on...and even such general institutions as private property, marriage, and political power."³¹ Without this symbolic capability of language, Searle believes that there would be no human culture or social institutions.

³⁰ See: Holland, John. *Hidden Order: How Adaptation Builds Complexity*. Addison-Wesley. 1995.
Kauffman, Stuart. *The Origins of Order: Self-Organization and Selection in Evolution*. Oxford University Press. 1993.

Wolfram, *A New Kind of Science*.

³¹ Ibid, p. 129.

I believe that language is the fundamental human institution in the sense that other institutions such as money, government, private property, marriage, and games require language, or at least language-like forms of symbolism, in a way that language does not require other institutions for its existence.³²

Terrence Deacon makes a very similar point, but from the vantage point of an anthropologist who has studied the evolution of language and the brain over a 2-million-year period.

All symbolizing hominids are linked via a common pool of symbolic information, one that is as inaccessible to other species as are human genes. We are all heirs of symbolic forms that were passed down from one generation to the next, from one group to another, forming a single unbroken tradition. We derive all our symbolic “traits” from this common pool and contribute to its promulgation. Being a part of this symbolic information lineage is in many respects a more diagnostic trait for “humanness” than any physical trait. Evolutionary phylogenies are denied in terms of inheritance of information, but not all the information that determines a species’ defining characteristics is coded as genes.³³

Searle’s X-Y-C rule is especially intriguing because it hints at explaining how new layers of social organization naturally emerge and take on a life of their own. For example, by enabling one symbol to stand for another and by creating contextually marked substitution options, it is possible to create new systems of meaning and social construction that on the one hand are part of the old order and preserve those relationships, and on the other hand, introduce new possibilities of behavior at a separate but differentiated level. Searle’s example of the evolution of money is one of many social institutional examples, such as the institution of marriage property rights, which began as one set of relationships and evolved over time to become something quite different. (Hence, the impossibility of retroactively “reconstructing original intent” from a set of founding institutional principles, and the inadvisability, indeed the maladaptiveness, of adhering to fixed initial institutional rules.) This capacity to generate emergent layers of organization is functionally equivalent to what occurs in the morphological development in biological evolution, and is therefore arguably a deep-seated ESS that has been captured and exploited in the organization of the human brain. Whereas other species

32 Ibid, p. 159.

33 Deacon, *The Symbolic Species*. p. 343.

may have discovered specific instances of social contracts, human beings appear to have captured and embodied the “meta-engine” that generates all forms of social contracts.

Returning to Searle’s observation about the priority of language, it is clear that although there are many disagreements about how linguistic universals came into being and whether or not they were encoded biologically, there does appear to be a general consensus on some of the primitives underlying all languages. Without getting into the nuances of the debate over the biological origins and innateness of language, suffice it to say that all languages appear to have what is called an operator/operand component, or in linguistic terms, a kind of predicate/argument grammar where verbs act as logical operators, and can take nouns and complex embedded phrases as their arguments. What language allows for, as a form of symbolic communication, is the invention and communication of arbitrarily complex layers of meaning and representation: Searle’s X-Y-C rule. The ability to express complex forms of embedded relationships, such as in the sentence,

“The cat that ate the rat that ate the cheese went out the door.”

is an example of what linguists and computer scientists call “context sensitive grammars,” a uniquely human ability.

What makes such grammars especially relevant to the discussion of social cooperation is that they have the computational or expressive power of a Turing Machine,³⁴ which suggests that Searle’s institutional “grammars, and the grammars of all languages, and the grammars for all computers are mathematically equivalent.”³⁵ Turing Machines represent the upper limit to what is computable and are the theoretical basis for the design of all computers today. If Searle’s X-Y-C rule is correct and social institutions are constructs of language, then in the future they can be analyzed, designed, and evolved computationally as variants of Turing Machines. Instead of treating multi-agent simulation models of

34 Developed by the mathematician Alan Turing, it is a representation of all that is computable. See: Dyson, George. *Darwin Among the Machines: The evolution of global intelligence*. Addison-Wesley. 1997. pp. 70-73.

35 Zhong, Ning and Klaus Weihrauch. “Computability Theory of Generalized Functions.” Association for Computing Machinery. *Journal of the Association for Computing Machinery*. Vol 50, Issue 4. New York, NY. 2003. p. 469.

social phenomena³⁶ as kinds of approximations, it may be possible to make the far stronger claim that social and institutional realities are indeed kinds of Turing Machines! If such is the case, and this is certainly highly speculative at this point, then there is the prospect for creating normative criteria for assessing the computational efficacy and power of different forms of social and institutional organization.

With this new view of human nature and the evolutionary importance of social cooperation in the sections to follow, we briefly examine some widely held beliefs about how people collaborate and share resources. Much of the current research on social networks and collaboration tends to treat social networks as static networks, drawing on examples of flocking animals and swarming insects as metaphors for certain forms of human collective action. It is important to bear in mind that these are examples of what Searle calls *social realities* and do not account for a major aspect of human collective behavior: *institutional reality* construction, a dynamic and creative process that is uniquely human.

Language, command intent, and social construction

One of the most effective means for a labor union to bring a company to the bargaining table in the United Kingdom was for its members to literally follow the work rules. Similar literalness of interpretation of an order or task can be crippling to any organization. Common sense would dictate that only in the rarest of circumstances can orders be literally interpreted. But then, how is it possible to be precise in communicating the intent of an order without being literal about an order? How is it that effective teams can know command intent without having to be told it and can get it correct for a variety of circumstances whereas others either altogether? In edge organizations where command is dispersed and pushed out to the edge the reliable, replicable and scaleable understanding of command intent is essential.

The literature on the social use of language is very clear on the matter of how people communicate intent and may provide significant insight into how to design effective

36 Page, Scott and Lu Hong. "Diversity and Optimality." Working Paper. University of Michigan. May 22, 2002. www.pscs.umich.edu/diversity (June 2004)

orders and tasks. Language is both the product and the instrument of highly creative, dynamic, and social processes. The English language, for example, has two types of “registers”: a low register that is essentially the colloquial use of everyday terms that are “underspecified,” and a high register often made of Latinate terms that are technical and highly specified.³⁷ Register is based upon the classical notion of decorum, whereby certain levels of usage are considered appropriate (or inappropriate) to particular topics and social situations.³⁸ The higher the register is, the less subject the term is to interpretation by the listener, and hence, the more formal and prescriptive it is. Associated with a term is a semantic field of meanings that move from slang and colloquial interpretations up to scientific and technical interpretations—the most “impersonal” and highly specified.

The following table contains examples of high and low register terms for “mad” behavior. Notice how the higher register terms differ on a dimension of the *type* of mad behavior (a kind of diagnostic distinction) whereas the lower register terms reflect a kind social acceptance or distancing distinction.

High Register Terms	Low Register Terms
Melancholic	Demented
Hypochondriac	Insane
Catatonic	Mad
Manic	Mental
Schizoid	Bonkers
Non compos mentis	Cuckoo
Schizophrenic	Loony
Psychotic	Crazy
Neurotic	Nuts

Table 1. High and Low Register Terms for “Mad” Behavior

Often in an attempt to be more precise and therefore less subject to misinterpretation, high register terms are used to issue orders and tasks on the mistaken assumption that the more specified a term is, the better command intent is communicated.

³⁷ Hughes, Geoffrey. *A History of English Words*. Blackwell Publishers. 2000.

³⁸ *Ibid.* page 4.

Unless the task is very technical and well-specified (which even many technical tasks are not), the more effective and reliable course is to use low register terms. Low register terms provide clear signaling, whereas high register terms require the recipient to interpret and improvise within the context that the commander has identified. The reason that people are able to infer command intent is that over tens of thousands of years they have evolved mirror neurons and the ability to construct and confirm “common theories of mind” through shared experiences. These are extremely important and often undervalued competences that are overlooked because of the mistaken assumption that interpersonal directives can be fully and unambiguously specified through high register communications, or less graciously, “bureaucratese.” The challenge from an edge command and control perspective is to understand those conditions whereby intent can be most readily and deliberately framed—appropriate language registers, shared experiences, and internalized social protocols.

A possible insight into how command intent can both evolve over time and yet preserve its original purpose is the example of Searle’s X-Y-C rule to account for how the meaning of money as an exchange currency evolved over time. This example shows how the social “intent” of providing an effective method of exchange can express itself through new circumstances and technologies while still preserving its original definition and purpose. Virtually everything about money has changed—from bartering to gold and silver to paper monies to digital currency—and yet these are all recognizable as forms of exchange. This ability to improvise and create new social facts and institutions within “intent preserving” boundaries is a unique human capability, and one that might be better understood and augmented to achieve more effective distributed command and control structures. If appropriately understood, a variety of technologies could be built to more precisely express command intent and provide support technologies for the dynamic generation of context-specific meta-tags that would recognize and categorize terms appropriate to command contexts.

Trust and transparency

As Dunbar correctly noted, the ability to evaluate the quality of a social relationship is a precondition for social self-organization. Trust is the consequence or state when one or

more members of a network perform according to mutual expectation. It is not an abstract moral virtue, but a network property—a byproduct of the quality of interactions between parties.³⁹ Trust requires measurement, feedback, and accountability. In most social networks, the consequences of low trust are high transaction costs: the need to enforce breaches, to create alternatives, or simply the failure to execute some kinds of interactions or exchange. In such social groups, low trust individuals are identified and excluded from the group. Again, as Dunbar pointed out in his analysis of grooming and gossip behaviors among primates and humans, the need to constantly contact and confirm relations is a way of achieving social cohesion. If members find that they are being excluded or have not been receiving their normal number of grooming contacts, they can correctly infer this as a rebuke, and that they need to re-earn the group's interest and trust.⁴⁰ The ability to build and leverage trust among members of a group builds *social capital* and significantly reduces transaction costs because such networks become self-synchronizing and self-enforcing.

The other key component for self-organization is transparency. Everyone in a social network needs to see what the others are doing so that there are no hidden agendas or false measures, and each can adjust their behaviors to the others. Transparency is not only a precondition for effective markets, but organizations as well, and becomes the basis for applying peer pressure, one of the most effective means for enforcing social norms. Peer pressure is also so pervasive and cuts across so many social species that it is very likely to be an ESS and a biologically innate algorithm.

Bounded and unbounded rationality

Another established way to look at collaboration and coordination in organizations is from an economics perspective, whereby independent actors are seen as making rational choices based upon their informed self-interest. Such economic analyses presume that every decisionmaker possesses a combination of *unbounded rationality*, *unbounded*

³⁹ Sober, Elliot and David Sloan Wilson. *Unto Others: The Evolution and Psychology and Unselfish Behavior*. Cambridge, MA: Harvard University Press. 1998.

⁴⁰ See: Flack, J. and F.B.M. de Waal. "Any Animal Whatever: Darwinian building blocks of morality in monkeys and apes." *Journal of Consciousness Studies*. 7 (1-2). 2000. pp. 1–29.
DeWaal, F.B.M. "The chimpanzee's service economy: Food for grooming, evolution, and human behavior." 1997. pp. 375-86.

greed, and *unbounded will power*.⁴¹ While such notions are recognized as simplifications, they are, nonetheless, considered to be sufficiently accurate to be retained and asserted. Economic rationality is computed in terms of tradeoffs between risks and prices, with the presumption that preferences and utility functions can be expressed in terms of price. The rational actor is one who always pays the right price given his preferences and uncertainty.

However, the results of recent experimental and behavioral economic studies⁴² have provided a growing body of evidence refuting classic economic assumptions about human behavior and rationality. A new generation of experimentally oriented economists, including Noble Laureates Vernon Smith and Daniel Kahneman,⁴³ have experimentally challenged the core tenants of classical economics—unbounded rationality, selfishness, and willpower—and are forging more complex models of cooperation and decisionmaking based upon cross-cultural studies, brain science, game theory, evolutionary biology and multi-agent simulation. The results of these studies are highly germane to understanding the failure of classic notions of collaborative decisionmaking because they tell us that rather than being independent agents, people have socially constructed identities⁴⁴ and innate, biologically set protocols for cooperation and social exchange. Furthermore, rather than the rule sets of selfishness and zero sum competition being the formative principles of human organization, the rule sets of *altruistic reciprocity* not only seem to be far more pervasive cross culturally than the principles of *Homo economicus*, but according to evolutionary biologists and game theorists,⁴⁵ yet another example of ESS.

Consistent with the points referenced earlier by Damasio, Searle, Deacon, Lakoff, and Dunbar, two prominent behavioral economists, Mullainathan and Thaler, characterized

⁴¹ Mullainathan, Sendhil and Richard H. Thaler. "Behavior Economics." *International Encyclopedia of the Social and Behavioral Sciences*. San Leandro, CA: Elsevier Science. 2001.

⁴² Bowles, S. and H. Gintis. *The Origins of Human Cooperation*. Working Paper. Santa Fe Institute. 2002. Thaler, R. *Advances In Behavioral Finance*. Russell Sage Foundation. 1993.

⁴³ Smith, Vernon. "Mind, Reciprocity, and Markets in the Laboratory." *Wirtschaft*. 10. August 2001. p. 21. Kahneman, Daniel and Amos Tversky. *Choice, Values, and Frames*. Cambridge, MA: Cambridge University Press. 2000.

⁴⁴ Bowles, *The Origins of Human Cooperation*.

⁴⁵ Trivers, "The Evolution of Reciprocal Altruism." Page, "Diversity and Optimality."

the essence of human decisionmaking not as an optimization strategy of trying to get the most and best information, but rather a rule of thumb strategy, much like turning to friends or trusted peers in small world networks.

Since we have only so much brainpower, and only so much time, we cannot be expected to solve difficult problems optimally. It is eminently “rational” for people to adopt rules of thumb as a way to economize on cognitive faculties.⁴⁶

The reality of the world is that people do not live in the economist’s world of perfect information, but always have to make decisions with imperfect information. From the perspective of social networks, local information is a form of *bounded* rationality and the ability to approximate the power of global information, or *unbounded* rationality in the economist’s sense, is achieved through the interconnection of trusted peer social networks. Global knowledge and collective rationality are an emergent phenomenon arising from the interactions and the protocols of the different peer networks. Instead of unbounded selfishness—the presumption of classic economic theory—being a prerequisite for rational decisionmaking and efficient functioning of a social exchange network, the opposite in many cases is true; trust across networks and even among strangers is a prerequisite for effective exchange.⁴⁷

Therefore, it is not surprising that recent research by behavioral economists such as Smith, Kahneman, Thaler, and the neuro-economist McCabe⁴⁸ have found that reciprocity, the ability to interpret each other’s behaviors and intentions, and trust appear to be highly effective social exchange algorithms that underlie many forms of economic behaviors from corporate finance, trading, and savings.⁴⁹ What is especially compelling about these kinds of results is that the findings from such diverse fields of inquiry—neuroscience, anthropology, evolutionary biology, complexity sciences, cognitive science, behavioral economics—all seem to be converging towards a common picture on how people act and organize to cooperatively solve complex problems.

46 Mullainathan, Sendhil and Richard H. Thaler. “Behavior Economics.” *International Encyclopedia of the Social and Behavioral Sciences*. San Leandro, CA: Elsevier Science. 2001.

47 Grimes, Ken. “Neuro-economics: To Trust is Human.” *New Scientist*. May 10, 2003.

48 McCabe, K. and Vernon Smith eds. *Bounded Rationality: The Adaptive Toolbox*. Cambridge, MA: MIT Press. 2000.

49 Thaler, *Advances in Behavioral Finance*.

Cooperation, decision rights, and social contracts

Another, related perspective on the debate over effective coordination comes from Nobel Laureate economist Ronald Coase's classic analysis⁵⁰ of the conditions under which cooperation is best left to the "nimble fingers" of the market and when it requires "the thick thumbs" of management. Coase argued that when the contracting and information transfer costs were sufficiently low and were supported by pricing mechanisms, markets resulted in far fewer "agency costs" and hence were preferable to management's hierarchical controls. However, the reason that there are so many firms is that the cost of knowledge transfer across organizational boundaries often can be prohibitive, and hence the hierarchical controls of firms are more efficient than markets. According to Michael Jensen,⁵¹ a Coase-influenced organizational economist, "vast amounts of information are specific" (what we have termed *local*) and the cost of transferring specific information among agents is prohibitive. Jensen elaborates:

In such cases, the common managerial tactic of moving the knowledge to the decisionmaker is not likely to work. Instead, we must *place the decision rights for which that knowledge is valuable in the hands of the person with the knowledge.* (This is the real economic advantage inherent in the modern empowerment movement.) We can then also move the "general" knowledge, which can be moved at lower costs to the decentralized decisionmaker.⁵²

Jensen's critique of centralized decisionmaking is similar to the critique that we made earlier about hierarchical decisionmaking. Although Jensen is a rational economist of the classical school (adhering to notions of unbounded self-interest and rationality), he nonetheless makes an argument for the power of peer networks over the more common hub-and-spoke models.

A key platform for his argument is the notion of the "alienability" of decision rights, which he defines as

the right to choose an action and to take an action, in a context where the police powers of the state will be used to ensure the party's ability to take the action. An

50 Coase, R. "The Nature of the Firm." 4 *Economica* (n.s.) 386. 1937.

51 Jensen, M. *Foundations of Organizational Strategy*. Cambridge, MA: Harvard University Press. 1998.

52 Ibid.

alienable decision right is the one that can be sold or exchanged by the owner with the owner pocketing the proceeds offered in the exchange.⁵³

Put in the terms of our earlier discussion of social exchange theory, the alienability or assignability of decision rights is similar to the notion of social protocols that provide mechanisms for assigning and routing the control points for authorizing and enabling different types of exchange and interaction.⁵⁴

The combination of insights arising from the existence of evolutionarily stable, innate human social exchange algorithms such as altruistic reciprocity and specialized social exchange competencies (e.g., the ability to detect cheaters or read other peoples' intentions)⁵⁵ suggests that as a species, we have evolved highly efficient methods for reducing the “social contracting” costs of collaboration and social exchange. As will be discussed later, digital peer-to-peer networks hold the promise of dramatically reducing the agency costs of transferring specialized information and achieving organizational networks with the scale and efficiencies of markets for the exchange of non-economic goods and services.

Conclusion

The biological, evolutionary, and neurological sciences are rapidly developing a scientific and rigorous understanding of how people think, feel, interact, and conduct themselves as social beings. Not only will scientific knowledge replace speculation and superstition, but new forms of intervention—genetic, cognitive, pharmaceutical, and social technological—will greatly enhance our abilities to create more effective social organizations and institutions. The genie is out of the bottle. Fields such as neuro-economics and evolutionary psychology are beginning to understand the neuro-scientific and evolutionary significance of market, trust, social coordination, and risk sharing behaviors. These findings are making it possible to understand how social networks naturally self-organize to leverage innate human capacities and proclivities for trust and

53 Ibid.

54 Skeptics of this new type of organizational structure and information handling can be found in many countries. For example: Flaherty, Christopher. “Relevance of the U.S. Transformation Paradigm for the Australian Defense Forces.” Presented at the 8th ICCRTS at NDU. June 2003.
http://www.dodccrp.org/events/2003/8th_ICCRTS/Tracks/track_5.htm (Feb 2004)

55 Cosmides, *Evolutionary Psychology*.

community building. Moreover, by understanding how different social networks evolved to resolve complex social coordination and cooperation problems, it may also become feasible to design organizations that represent evolutionary stable strategies, which in effect, says that they are highly adaptive under different fitness conditions.

In terms of the overall mission of this book (which is to provide the principles, techniques and justification for transforming hierarchical, command and control organizations, into highly agile, self-synchronizing networks), recent research findings on human nature are very encouraging. In contrast to well-entrenched economic and organizational models that assumed human beings to be selfish, individualistic, and rational actors, human beings are innately cooperative and have evolved innate strategies of collaboration, trust, and reciprocity that have proven to be highly adaptive. Not only are such peer-based strategies of collaboration prevalent among human groups, but they seem to represent more general evolutionary strategies that are stable for a variety of species. Moreover, human beings seem to have evolved unique capacities for interpreting one another's signals, and novel forms of representation, reciprocation, and symbolization. By understanding how such innate human social exchange competencies function, networked organizations might be designed and implemented that scale human trust and create flexible organizations that can rapidly learn and adapt to change.

Chapter Six

Trust

Introduction

The previous chapter argued that many “soft” concepts such as trust, feelings, and empathy have a hard scientific expression in neurological structures and a rationale based upon evolutionary theory. This chapter takes a more extensive look at the concept of trust and the role it plays in social networks. Rather than being seen as an intangible value, trust is seen as a dependent variable, a property of the architecture of social networks and social protocols that members of the network employ (independent variables).

The online auction house eBay is seen as the existence proof of the ability to create highly scaleable networks built upon trust. If trust is a dependent variable, then different kinds of network leadership roles like network topologies can be regarded as some of the independent variables that are required to have highly trustworthy and effective networks.

Trust as a network property

Trust is the cornerstone of cooperation. It is a function of familiarity and respect. A senior trusts subordinates to carry out the assigned missions completely with minimal supervision, act in consonance with the overall intent, report developments as necessary, and effect the necessary coordination. Subordinates meanwhile trust that the senior will provide the necessary guidance and will support them loyally and fully, even when they make mistakes.... Trust has a reverse side: it must be earned as well as given. We earn the trust of others by demonstrating competence, a sense of responsibility, loyalty, and self-discipline.⁵⁶

What is the currency that drives and holds together highly successfully military operations? It is not money; you cannot assign a monetary value to the risks or the likelihood of death that combatants incur. It is not even status and glory, because many of the most valorous and critical actions go unnoticed. Rather, it is trust.

Hence, the military already has one of the basic ingredients for the formation of networked organizations—peer trust. But this trust does not extend naturally beyond the

⁵⁶ Command and Control. U.S. Marine Corps. PCN 142 0000100. p. 114.

immediate self-identity group. This section briefly explores how trust might be created or enhanced and then suggests how the conditions for trust to emerge might be designed into the operations of large-scale networked organizations.

Whether in business, warfare, or personal relationships, trust is often cited as the most important attribute for success. Yet how trust is to be formed and sustained when few of the parties know one another is one of the premier challenges confronting large-scale, dispersed organizations that are involved in network-centric operations. This is especially true in the case of network-centric operations, particularly in multinational OOTW that require not only cooperation among the different Services and Agencies, military and civilian, but also cooperation among coalition partners who have different perceptions, goals, values, capabilities, cultures, and traditions.

Trust under these circumstances would seem unlikely at best, as it is generally regarded as an intangible social value that is difficult to inculcate, harder still to replicate, and virtually impossible to scale. Yet, as the following quotation from the U.S. Marine Corps doctrine publication makes clear, trust is essential for moving beyond a strictly hierarchical command and control model to one that is agile, flexible, and networked.

The aim is not to increase our capacity to perform command and control. It is not more command and control that we are after. Instead we seek to decrease the amount of command and control we need. We do this by replacing coercive command and control methods with spontaneous, self-disciplined cooperation, based on low-level initiative, a commonly understood commander's intent, mutual trust, and implicit understanding and communications.⁵⁷

The question then becomes: how can large-scale social networks be created such that they are spontaneous, self-disciplined, and guided by mutual trust? As it turns out, small-scale social networks of peers can be terribly effective at controlling and synchronizing themselves through subtle forms of peer pressure. As we have seen from recent research from a variety of disciplines—evolutionary biology and psychology, anthropology, neurosciences, and complexity sciences—human beings have built-in algorithms and protocols for directing their social behaviors and cooperation for groups of up to 150

⁵⁷ Ibid.

members.⁵⁸ However, in groups of more than 200 individuals, our innate capacity to track and enforce social relationships breaks down, introducing hierarchy, coercion, and deception.⁵⁹

Digital technologies offer unprecedented opportunities for amplifying our innate abilities to track and manage social relationships by providing virtual methods for assembling, tagging, and rating one another's behaviors, and thereby achieving new forms of visibility, accountability, and hence trust and cooperation. Peer-to-peer networking technologies—from e-mail to instant messaging, to various forms of “peer production networks” and the Open Source movements—have demonstrated that networks of trust and cooperation can be created as the result of the topologies and social protocols of digital peer-to-peer networks. In other words, trust and cooperation may be scaleable at a level not previously thought possible.

Trust at a distance: eBay

Pierre Omidyar, the founder of eBay, has always believed that trust was the foundation of human social exchange and community.⁶⁰ He founded eBay on the untested, unproven notion that total strangers could come to trust one another sufficiently to engage in significant financial transactions. In contrast to the assumptions of *Homo economicus* in classical economic theory, which holds that man is innately selfish and distrusting, Omidyar believed that people naturally want to trust one another and are not guided by Hobbesian notions of greed and narrow self-interest, but rather by principles of reciprocity and community. In a letter to the members of eBay, Omidyar characterized eBay as a “grand experiment...creating an open market that encourages honest dealings...to make it easier to conduct business with strangers over the Net.”⁶¹ What made eBay such a phenomenal success, however, was not starry-eyed idealism, but rather a genuine insight into the *mechanics* of how people formed their identities within communities where their actions were visible.

58 Dunbar, *Grooming*. p. 72.

59 Ibid.

60 Cohen, Adam. *The Perfect Store: Inside eBay*. Boston, MA: Little, Brown. 2002.

61 “eBay (A) The Customer Marketplace.” Harvard Business School Case Study 9-602-071. December 4, 2001. p. 3. <http://www.ebay.com>

A feedback system was created to accommodate members' evaluations of one another. eBay solicited feedback from the participants after each transaction. Buyers and sellers rated one another as positive, negative, or neutral, and often appended a brief comment in their feedback. These ratings became a permanent part of each user's membership file on the site.⁶²

Members were able to achieve standing in their respective communities through their service ratings and by their contributions to the chat rooms associated with their product categories. Members could achieve a unique kind of social status, influence, and visibility not normally accorded to them in the physical world. The eBay mechanisms for building trust were so successful that fraud registered less than 0.01 percent of all transactions to the point where a Corvette was sold on eBay every 3 hours and over \$9 billion of goods were sold in 2001.⁶³

Early on, eBay had many competitors including Amazon, Yahoo!, and OnSale. However, what accounted for eBay's long-term economic success was not its prowess as a fierce competitor or proficient auctioneer, but its seemingly uneconomic emphasis on community and trust.

After using eBay for just a short time, users became actively involved in e-mail dialogue, their reputations on the system were built as other users observed their actions and rated their reliability, and users came to know the ins and outs of the system. The community was also self-policing, and users frequently formed "neighborhood watch" groups to help guard against user violations of site etiquette...Stories about eBay users helping one another prevailed. For example, during the 1998 holiday season, eBay started the Giving Board for people to post stories about people in need... The response to the board was so overwhelming that a committee of eBay members was formed to help coordinate charitable efforts of the Giving Board.⁶⁴

Many of eBay's competitors tried to compete on traditional economic grounds, not recognizing that the success and lure of eBay resided in its commitment to build communities where members were connected to one another and were empowered to shape the offerings of the company. Meg Whitman, eBay's CEO, was clever enough to

62 Ibid, p. 3.

63 "2001 Annual Report." eBay Investor Relations. p. 1. <http://investor.ebay.com/annual.cfm> (Feb 2004)

64 Ibid, p. 10.

recognize this from the beginning and identifies it as one of eBay's unique competitive advantages:

OnSale's view of the world was the following: it's auctions and it's economic warfare. This isn't about auctions. It's about community commerce. Auctions are the enabler. I don't think they understood that. It's not economic warfare; in fact, it's the opposite. It's about you and me making a connection over a shared area of interest.⁶⁵

Ironically, the hardheaded pragmatism and economic orthodoxy of eBay's competitors blinded them to what the real objectives or effects of their competition were: satisfied customers and suppliers who identified with the company. In other words, eBay's competitors were fighting the wrong war; they presumed that their customers were rational economic actors, maximizing their own self-interests. The eBay model is such an anathema to conventional economic wisdom that it is not difficult to see how it was misunderstood and even discounted by its competitors as an aberration of the dot-com era. However, what makes eBay so important is that it was the first commercial organization to successfully scale trust as a network property, and capture it as an economic and organizational asset. Furthermore, the principles and the mechanisms it developed are inherently simple and widely applicable.

The eBay example is also important because it is the first economically successful model of a "post-market networked enterprise," which is to say that its success did not derive solely from pure economic principles and motives, as most of its competitors presumed, but from the creation of community principles with its customers. In short, its customers were *members* who were both producers and consumers, and the value that eBay created was in enabling the exchange of goods and social assets in a safe context. Whenever eBay tried to lay claim to the ownership of the eBay space or impose its will and directives on its members, it was met with immediate and overwhelming negative responses ("flaming" and rebukes) from the membership.

65 "eBay, Inc." Harvard Business School Case Study 9-700-007. p. 10.

Open Source movements and peer production networks

Collaborative work is another area where trust is paramount. Here, the trust issue is not about being defrauded in a transaction per se, but rather about certifying the quality and extent of a member's contribution to a common effort, and thereby providing for the equitable allocation of rewards. In collaborative work, poor quality and free riders are the agents of distrust.

Nowhere is collaboration more important than in software development. Software development, despite all efforts to the contrary, is an idiosyncratic, social collaborative effort that is more art than science. It is also a highly complex, arcane, and expertise-intensive undertaking that can have huge coordination costs. The billion dollar overruns on software projects undertaken by the leaders of the field (IBM, Microsoft, Oracle, and SAP) are legendary and well-documented. Here again, experience contradicts accepted wisdom: Open Source software, the voluntary development of software by tens of thousands of programmers, most of whom have never met each other, produces more reliable, robust, and scaleable software than that produced by commercial enterprises. It is a global movement, widely embraced by European, Asian, and developing governments eager to get out from under the yoke of predominately American software vendors and encompasses all types of software from the famed Linux operating system, to browsers (Safari), server software (Apache), Web hosting applications (PHP), grid services (Globus), Web services (WC3), and debuggers (Bugzilla).⁶⁶ The Open Source software movement is so pervasive and potent that it is capable of something that neither IBM nor any other commercial software vendor could do: dethrone the software hegemony of Microsoft. According to Professor Steven Weber, an expert on the Open Source software movement, “the notion of a proprietary operating system will seem quaint in the near future.”⁶⁷

This vision of the future of software has been adopted by IBM, which has aggressively embraced the Open Source software model, recognizing that its long-term interests reside in selling services to their premiere corporate customers. IBM has been the champion of

⁶⁶ See: www.eclipse.org, www.globus.org, www.apache.org, www.bugzilla.org

⁶⁷ Weber, Stephen. *The Success of Open Source*. Cambridge, MA: Harvard University Press. 2004.

open Java standards, Linux, and more recently, the Globus grid services software. Instead of investing billions of dollars in developing proprietary software in competition with other commercial vendors and the Open Source software movement, IBM has become a proponent of the commonwealth model, recognizing that their long-term commercial success depends upon the creation of common software assets that they can in turn adapt to the special needs of their customers.⁶⁸ In effect, the Open Source movement is creating a new form of common software resource that can then be adapted and appropriated for private commercial gain much more efficiently than if all parties acted independently on their own behalf.

Like eBay, the Open Source movement has developed highly sophisticated methods for building trust among large numbers of distributed actors. Protocols for how to evaluate, rate, and incorporate new software and covenants for its use and reuse developed by the commonwealth have been successfully worked out in sufficient detail that they have now become the accepted norm of software development. The classic strategy of locking in customers through enormous licensing agreements and proprietary “hooks” is slowly being phased out by the proliferation of high quality free software that is supported and extended by the commonwealth of producers and consumers.⁶⁹ The monetization of the value of this software is achieved through highly specialized and localized value-added services.

Trust as a reward

One of the drivers of the success of the Open Source movement is the power of peer review, which is achieved through visibility, ratings, and accountability, as in the eBay example. Monetary reward plays an even smaller role here than in eBay, as the motivator is peer recognition, standing, and access. What is especially instructive from an NCW perspective in this example is how quality is judged and rewards allocated. Trust is earned through a demonstrated competence with one’s peers and trust is given if subordinates know that their “seniors will provide the necessary guidance and support

68 Withers, Steven. “An Overview of Distributed Grid Computing.” *Technology & Business Magazine*. GRID Today. Nov 4, 2002. <http://www.gridtoday.com/02/1104/100635.html> (Feb 2004)

69 For example: Kelly and Ranger. “Whitehall vows to end proprietary lock-in.” Vnunet.com. July 25, 2002. <http://www.vnunet.com/News/1133883> (Feb 2004)

them loyally and fully, even when they make mistakes.”⁷⁰ As in the case of software development, peers must feel confident that their seniors are competent and make judgments openly and fairly and therefore equitably allocate rewards and rights. In technologically defined commonwealths, technical proficiency is more easily gauged than in less measurable environments, though it is by no means without ambiguity and controversy. Therefore, it is vital that the performance of seniors be subject to independent ratings that are credible to the commonwealth at large. Distrust and mayhem will occur where the rating systems of the peer networks and the senior or governing networks are not aligned. The more hierarchical and opaque an organization is, the more likely this undesirable outcome becomes. Hence, effective peer networks have very clear definitions of their common purpose and are able to rate senior and subordinate contributions accordingly. This is especially germane to network-centric operations that can include many different partners, each of whom have their own organizational agenda and reward structures. Should the localized property rights of individual agencies, services, or coalition partners inappropriately reward noncontributory behavior or encourage free riders to the detriment of the overall success of the mission, then the rot of distrust will set in and each party will retreat into its own narrow interests, thereby exponentially increasing the transaction costs of coordination.⁷¹ Hence, in order to have robust trust, the network must ensure transparency and accountability. In the case of NCW, the equivalent of the commonwealth is the mission wherein the property rights of all the participants are subordinate to the mission objectives in just the same way that John Adams saw the principles of a commonwealth trumping individual claims of “advantage” or “exclusive privileges.”

Conclusion

Recent scientific findings and the success of trust-based peer organizations like eBay seem to indicate that trust is very likely to be a property that is scaleable and can be engineered into peer networks. Like leadership, trust may be a much more tangible and

70 Command and Control. U.S. Marine Corps. PCN 142 0000100. p. 114.

See also: Zak, Paul. “Trust.” Capco Institute. *Journal of Financial Transformation*. pp. 17-23.

⁷¹ Dunbar, Robin, Chris Knight, and Camilla Power. *The Evolution of Culture*. New Brunswick, NJ: Rutgers University Press. 1999.

Dunbar, Robin. *Culture Honesty and the Free Rider Problem*. pp. 194 –213.

replicable capability than originally believed. The next chapter examines how leadership emerges as different roles within an organization, and how an organization needs to use those leadership roles to be successful.

Chapter Seven

Leadership

It is very true that I have said that I considered Napoleon's presence in the field equal to forty thousand men in the balance. —Duke of Wellington

One bad general does better than two good ones. —Napoleon

Introduction

During the early 19th century, Wellington's and Napoleon's⁷² observations made sense. With the onset of battle, communications became muddled, artillery was immobilized, and a commander's ability to control his forces was limited. Consequently, the leadership of a single general could prove decisive in battle by maintaining clarity of command and control.

We are now at a totally different stage of warfare. This not to say that the fog of war has completely lifted, but visibility and synchronized actions, and the speed, precision, and lethality of response is beyond comparison to anything that has preceded it. The battlefield success of the doctrine and technology of Network Centric Warfare was not based upon a single brilliant plan, or a single individual or group, but rather was a property of the network, both technologically and organizationally. As Operation Iraqi Freedom so vividly illustrated,⁷³ battle plans can now be changed very rapidly, affecting all aspects of operations—strategy, tactics, logistics and PSYOPs, operations, kinetics, and all types of forces. The competencies that make NCW a success are network properties; they are no longer solely the province of charismatic leaders or chance, but the result of diverse competencies and a new understanding of the role and growth of network leadership, and how it is learned and rewarded.

72 Roberts, Andrew. *Napoleon and Wellington: Battle of Waterloo- and the Great Commanders Who Fought It*. New York, NY: Simon and Schuster. 2001.

73 Hoagland, Jim. "The Franks Strategy: Fast and Flexible." *The Washington Post*. Washington, D.C. Apr 1, 2003. p. A-15.

Early leadership

Leadership among Greek warriors was based upon “a first among equals” principle. Such leadership was a product of a culture of equality and mutual accountability. In a very tangible sense, cultures are networks of social relationships. Military cultures, especially in battlefield situations, have highly articulated roles and codes of conduct and mutual accountability. Although an individual may gain prominence and status apart from a group, it is often not the result of individual achievement, but how the individual exemplifies certain traits that represent the best traits of that group, such as sacrifice, decisiveness, courage, initiative, and prowess. In fact, to attribute successes to the individual that derive from the group is to abrogate a core principle of true leadership: putting the group before the individual. In the following stanzas taken from Alfred Lord Tennyson’s ode to Wellington, many of the qualities that continue to make leaders great are captured:

...Mourn for the man of amplest influence,
Yet clearest of ambitious crime,
Our greatest yet with least pretence,
Great in council and great in war,
Foremost captain of his time,
Rich in saving common-sense,
And, as the greatest only are,
In his *simplicity sublime*...

...*Who never sold the truth to serve the hour,*
Nor palter’d with Eternal God for power;
Who let the turbid streams of rumor flow
Thro’ either babbling world of high and low;
Whose life was work, whose language rife
With rugged maxims hewn from life;
Who never spoke against a foe;
Whose eighty winters freeze with one rebuke
All great self-seekers trampling on the right.
Truth-teller was our England’s Alfred named;
Truth-lover was our English Duke;
Whatever record leap to light
He never shall be shamed...[emphasis added]⁷⁴

74 Tennyson, Alfred Lord. “Ode on the Death of the Duke of Wellington.” November 18, 1852.

By embodying the best qualities of a group, a military leader does not try to elevate himself above his peers, but brings honor and distinction to them, be they his company, brigade, division, or Service. These qualities of “simplicity sublime” and “truth-teller” are parts of the best of military culture. They are hard to transfer from the field of battle into bureaucratic and administrative assignments, where often different kinds of codes of conduct are rewarded. As noted earlier, small networks of 150-200 individuals can still be coordinated by face-to-face relationships and personal codes of honor and accountability. At such a scale, combat relationships are more transparent and accountable, and hence, not so easily “gamed” and “politicized” as in hierarchical, formal organizations. It is not surprising that many who succeed on the battlefield fail to adjust to the rules of a bureaucratic organization, whose codes of success are often at variance with those of the battlefield group. In bureaucratic organizations, successful leadership can entail the subordination of the interests of the group to the promotion of the individual, as visibility to outside parties is associated with an individual leader who is *personally* credited with a certain policy or success. Under such circumstances, the leader in bureaucratic groups becomes a marker, a kind of shorthand, for the success or failure of an issue, policy, or campaign—not the exemplar of the group. This kind of leadership can entail taking much of the credit and little of the blame, thereby undermining the very principles of transparency and accountability upon which effective peer networks depend.

The systemic failure of corporate leadership and governance in the United States over the last 10 years can be partly attributed to such a bureaucratic culture wherein a company’s success was almost totally attributed to the skills of the CEO and senior management. This was reflected in senior executive compensation packages that ballooned to 301 times the average worker’s pay package.⁷⁵ Yet when the downturn came, and even widespread fraudulent practices were revealed, very few corporate leaders were held accountable, and shareholders and employees assumed the bulk of the losses. These failures were neither personality- nor individually-based, but were systemic in terms of how leaders were selected, cultivated, rewarded, and held accountable. The systemic subversion of

⁷⁵ See: Business Week’s 54th Annual CEO compensation review. 2004.

Also see: Beer, Michael and Nancy Katz. *Do Incentives Work? The Perceptions of Executives from Thirty Countries*. Cambridge, MA: Harvard Business School. 2003.

governance leadership roles needed to achieve independence, truth telling, and transparency has been its own kind of perverse “network effect.”

This chapter’s treatment of leadership is not founded upon any “great man” leadership model. This is not to say that individual qualities are not important, but rather that sustainable and replicable qualities of leadership are treated here as a network property, made possible by the combination of the character of the social network and the individuals themselves. Moreover, it will be argued that there are several different types of leadership roles and the relative importance and combination of these roles depends upon the circumstances and structure of the organizational networks involved.

Types of network leadership roles

There are at least eight different kinds of leadership roles in a networked organization. Each of these can be associated with specific network *signatures* consisting of patterns of links and nodes and the social rules governing their interactions. For example, some network leaders, such as visionaries, primarily generate new information and typically do not directly request others to perform tasks for them. They generally work in conjunction with “connector” and “facilitator” leaders who help them get their information out. Connectors, unlike visionaries, may have many symmetric dyadic interactions and act as gateways for a variety of sub-networks, whereas truth-teller leaders may only interact weakly with other members, having strong ties with a relatively small number of peers.

The eight principal network roles are discussed below. Many of these roles can coexist in the same person. However, as networks grow in scale and complexity, these roles often become highly differentiated and expressed as Searle’s *institutional facts*.⁷⁶



The Exemplar or “Alpha Member”

Most peer networks, whether they are military, technological, recreational, adolescent, criminal, terrorist, artistic, professional, or athletic, are founded by individuals who exemplify the standards and qualities that

⁷⁶ Searle, John. *Mind, Language, and Society*. New York, NY: Basic Books. 1998.

characterize the best competencies of the peer network. These are the role models that others imitate. Sometimes their role can be simply symbolic, even ceremonial, but they are nonetheless important in setting the tone and culture of the organization. Successful and charismatic founders of new organizations, from Bill Gates, Steve Jobs, and Sam Walton to Osama Bin Laden and Aum Shinrikyo, all embody values and personalities that become the values of their organization. These leaders also exemplify the assessment criteria and set the standards for becoming a member of a network. In the military, each Service has its own types of exemplars: pilots and Seals for the Navy; Green Berets, and Rangers for the Army; and fighter pilots for the Air Force. These exemplars embody what is considered the most difficult and admired professional qualities that set that Service apart.



The Gatekeeper

For every network there are membership rules—criteria for being included, retained, elevated, and excluded. The gatekeeper decides who is in and who is out. In Congressional politics, the party leadership plays this role by deciding who gets what committee assignments and whose bills take precedence in a legislative agenda. This is a role that President Johnson as the former majority leader of the Senate understood brilliantly, while President Carter—an outsider, visionary, truth-teller, and moralist—never fully appreciated. In many military organizations, the drill sergeant often plays multiple leadership roles, acting as exemplars, enforcers, and gatekeepers. He weeds out recruits whom he believes fail to meet the standards of his unit. The gatekeeper role is especially important for elite units that seek to achieve a high degree of exclusivity based upon exceptional standards of excellence. Like the doorman to exclusive clubs, the gatekeeper role is a combination of truth-teller, applying the standard for admittance, and enforcer, denying admittance to those parties that fail the test.



The Visionary

The role of the visionary leader is to imagine futures, determine what is

limiting about the present, and show what is possible in the future. Visionary leaders such as Steve Jobs, Winston Churchill, Walt Disney, Craig Venter, Billy Mitchell, and Thomas Edison are a constant fount of new ideas and are “at war with the present.” Many high technology startups have been founded by visionaries, but eventually end up being run by operatives or “fixers.” The visionary leader imagines new possibilities, creating new institutional facts and realities, and therefore plays a critical role in moving networked organizations in new directions. This is an absolutely critical role in the start-up or crisis phase of an organization. However, it can also be disruptive in circumstances where continuity and execution are critical to success.

Visionaries play a vital and sometimes contentious role within the military. They are often the first to see weaknesses in prevalent military doctrine, to espouse new technologies and doctrines, and therefore, to challenge current leadership and entrenched interests. Consequently, unless they are able to prove themselves within wartime, their ideas can languish for decades. Rare are the individuals such as Lord Nelson or Napoleon, who were both visionaries and the senior commanders. In the case of Billy Mitchell (who championed the use of aircraft carriers), Col. Steven Boyd (the father of the OODA loop), or even Winston Churchill, it was only later in their careers that their innovations were appreciated. However, as the nature of warfare today is in constant transition with respect both to doctrine and new technologies, the visionary will have increased influence.

The visionary role is best coevolved with that of the truth-teller.



The Truth-Teller

In every network organization, someone has to keep the network honest. This entails the very challenging task of identifying free riders and cheaters. In knowledge-based organizations, it is also about ferreting out half-truths, spin, blunders, and lies. Such a leadership role can become easily compromised Like the accounting function in a corporation or the judicial function in the legal system, truth-tellers can lose their independence, and hence effectiveness. Since these are often the first roles to go in times of stress, successful leadership is exemplified here by independence,

transparency, accuracy, and candor in the face of enormous pressure. As Tennyson's ode to Wellington⁷⁷ eloquently and astutely expresses, truth telling and resistance to the lure of fame go hand in hand and are a critical and enduring signature of effective leadership. One of the arguments for modesty in leadership is that the lure of celebrity and its attendant rewards can compromise independence and hence, credibility. Therefore, if a leader is to be an effective truth-teller, he or she must also be credible, and even the hint of self-dealing can undermine his effectiveness.

The challenges are especially acute and consequential within military organizations. If credibility breaks down, trust soon becomes the next casualty, and then the overall effectiveness of the chain of command. The admonition, "Don't shoot the messenger" is taken from military experience and reflects the high potential cost of reporting unwanted information. In response to such pressures, the military developed the doctrine of "ground truth" after the Vietnam War. The "truth-telling" goal is to provide authenticated and accurate reporting of the outcomes of missions. It can take enormous courage to resist the inevitable pressures of peers and superiors to report what they want to be known, rather than the truth of the matter. Being a truth-teller can be highly unpopular and the long road to advancement.

Even highly established and previously unchallenged military institutions can come under enormous pressure for truth-telling. The armed forces newspaper, Stars and Stripes, undertook its own "ground truth investigation" into morale in Iraq in 2003 and was widely censured by some members of Congress and threatened with a reduced budget for its reporting.⁷⁸ Similarly, the success and credibility of the inquiry into the alleged tortures within Abu Ghraib and elsewhere within Iraq and Afghanistan will depend upon individuals assuming very strong "truth teller" leadership roles.

⁷⁷ Tennyson, Alfred Lord. "Ode on the Death of the Duke of Wellington." November 18, 1852.

⁷⁸ See: Stars and Stripes website: www.stripes.com and "Finding a Balance at Stars and Stripes." NPR, 3-10-04.



The Fixer

This is an individual who knows how to get things done and measures him or herself not just by how many people they might know, but rather how they can get things done that others cannot. Such individuals are results oriented. They “know where the bodies are buried” and what “makes people tick.” In politics, they are the operatives, the Mr. Fix-its. They are all about opening and closing loops—getting tasks done. In Tennyson’s words, they abide by the “rugged maxims hewn from life.” They are without illusions and are inherently pragmatic. They may interact with a range of other network leaders—visionaries, truth-tellers, and connectors—but always with a concrete outcome in mind.

Within the military there is the archetype of the “scrounger,” an individual who is highly skilled at finding and assembling “found” materials, people, and resources to solve a variety of human and mission needs, from chocolate and silk stockings during WWII, to scrap iron as armor plating for Humvees in Iraq. Fixers are gifted improvisers, what the French call “bricolagers,” who take common available materials and repurpose them into something useful. In contrast to those who work through formal channels and depend upon approved procedures, fixers typically are “rule benders” and work through informal networks. Within the British Army during the late Victorian period, the Quartermaster was famous for the orderly but creative acquisition of supplies under the most trying and unpredictable of circumstances.



The Connector

These network leaders participate in multiple social networks, connecting not only with a large number of members, but a highly diverse number of members as well. They are known for having numerous friends, connections, and contacts—for being consummate networkers. Like the visionary leaders, they can introduce variety and options into a network through the diversity of people with whom they interact. They are critical for identifying and accessing new resources and helping to get a message out. By building links across network boundaries, they can help

a networked organization break out of the “lock ins” of scale-free networks and introduce greater diversity, and hence robustness.

During WWII, General Eisenhower as the Supreme Allied Commander developed a reputation as a highly accomplished connector leader by virtue of his ability to relate to the different interests and cultural styles of the allied commanders. He was able to make and sustain connections among contending parties in order to keep the alliance together and on course. He was also able to exercise significant control over those whose primary allegiances were to different military organizations.



The Enforcer

In smaller networks, this role is often combined with that of the gatekeeper and even the truth-teller. However, in larger networks it is an independent role. Enforcement can mean physical coercion, but more often entails psychological or peer pressure. Like the truth-teller function, independence and transparency are critical for overall network effectiveness. Clearly, force and military means are the enforcement methods of last resort, but are necessary in order to buttress other forms of enforcement, which can vary from guilt and shame to legal redress. Most networks have their own forms of redress and enforcement that entail exclusion. The power of ostracism in Greek city-states, for example, was extremely effective because it not only removed an individual’s right of protection but destroyed their social identity as well.

An exceptional example of a senior commander acting to enforce discipline across all levels of command was the Duke of Wellington’s order during the Peninsular Campaign in 1807. Wellington issued an order that any breach in military discipline towards the treatment of the Spanish civilians and military would result in an immediate flogging and hanging. According to historian Paul Kennedy, this order was enforced with impartiality and force and was instrumental to Wellington’s success.⁷⁹

⁷⁹ Presentation of Paul Kennedy at Yale University CEO Summit. May, 2004.



The Facilitator

In order for a network to grow and evolve, it must be able to add new members and reach across network boundaries in order to do so. The facilitator role is pivotal in creating communities or sub-networks that provide the greatest form of network value. By assuming a leadership role in helping others, facilitators create value that benefits an entire network or community, whereas a connector, while playing a similar value creation role, appropriates value to himself and only indirectly benefits the overall group. The role of facilitator in many respects resembles that of the “community coordinator” in the development of communities of practice, a method developed for helping to create and leverage knowledge.⁸⁰

Within the military this role is filled primarily as a staff function to a commander, and therefore may not appear to have the cache of the connector or visionary leadership roles. However, in networked organizational structures where decisionmaking is more distributed and less hierarchical, this leadership role is vital to coordinating and enabling other actors and decisionmakers. In the case of networked organization, the facilitator role and the associated skills of enabling cooperation and self-organization will play a more critical role than within current hierarchical organizations. When self-synchronization depends upon peer-based cooperation, the facilitator role is a prerequisite for effective operations.

80 Wenger, Etienne, Richard McDermott, and William M. Snyder. *Cultivating Communities of Practice*. Cambridge, MA: Harvard Business School Press. 2002.

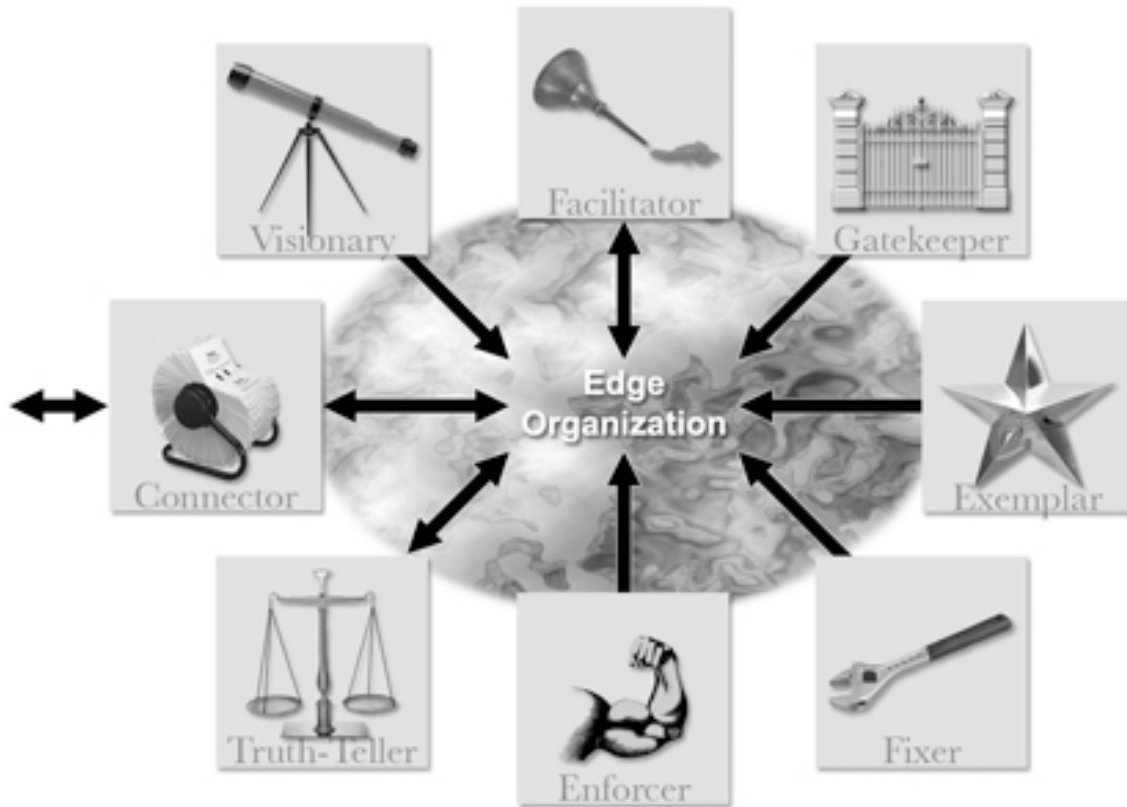


Figure 4. The Flow of Knowledge and Skills between Leaders and the Edge Organization

Network structures and leadership roles

Social networks self-organize to acquire and allocate resources such as information, goods, favors, access, privileges, and protection. As discussed in the previous chapter, the specialization of roles in social networks has been demonstrated to have strong long-term survival value, and therefore has been biologically encoded through evolutionary forces as innate psychological or personality traits. These traits are reflected in how people read social cues, detect cheaters, create and share ideas, and form affinities with strangers.

In addition to having innate social exchange competencies, some “alpha” or “exemplar” individuals are especially proficient at a skill or exhibit a prized trait that warrants widespread emulation and imitation. Typically, alpha individuals have a special physical prowess, physical attraction, intelligence, social proficiency, or some combination of

these traits. When one considers Cosmides and Tooby's findings⁸¹ on innate social exchange algorithms and Damasio's analysis of the neuro-physiology of social emotions combined with Dunbar's studies on the role of grooming and language in social groups, a compelling argument can be made that these different roles are an evolutionary stable strategy that makes possible the efficient functioning of any self-organizing social network. Few of these network roles have any intrinsic individual value. However, when combined with other roles, they enable the organization and functioning of complex networks of exchange relationships. Leadership in this context can be regarded as a proficiency in any one or combination of these network roles. In this sense, some individuals may have greater innate talents than others, but the effectiveness of these gifts is dependent upon the overall qualities of the network and the roles of other members of the network.

Network leadership roles assume different levels of importance depending upon the phase of evolution of a networked organization. This fact is often not fully appreciated in the business leadership literature where *visionary* leaders are periodically revered and reviled depending upon the ebb and flow of their company's earnings. The value of such leadership roles might be more fruitfully understood by attempting to determine the conditions under which a visionary role is adaptive and when it is not, thereby recognizing that it is one of many combinations of leadership roles that is required. Likewise, the absence of certain critical leadership roles, such as truth telling, can contribute to the failure of corporate governance or the excesses of overly zealous visionaries. A further example of the importance of different kinds of network leadership roles can be found in the failure of large organizations to manage relationships across functional and organizational boundaries. Here the high "agency costs" of coordinating across organizational or functional boundaries is largely due to the absence of leaders who are *connectors* and who know how to interact and affiliate with third parties to build trust. These are what Burton identified as the *tertiaries*,⁸² the brokers between

81 Cosmides, Leda and John Tooby. "Cognitive Adaptations for Social Exchange." *The Adapted Mind—Evolutionary Psychology and the Generation of Culture*. New York, NY: Oxford University Press. 1992.

82 Burt, *Structural Holes*.

organizational networks.⁸³ In each of these examples, there are leadership roles whose value and appropriateness depends upon the state of the network. The effective governance of a networked organization should therefore involve knowing the status of the organizational network, being able to assess the strengths and weaknesses of different roles, and then allocating the appropriate leadership assets to improve the overall performance of the network. This is something that Louis Gerstner understood when he first took the job of CEO at IBM. Initially, he was criticized for being insufficiently visionary, to which he responded that the company had become too enamored of its own vision and detached from reality. What was needed, he contended, was a good dose of truth-telling, an operational overhaul, and then a new vision. These were different leadership roles that he seemed to switch in and out of comfortably and effectively.⁸⁴

Joint leadership and meta-leadership

Just as there are different leadership roles *within* social networks, there are also meta-leadership roles that cut *across* networked organizations. When it comes to leading across different organizations, such as coalition partners, partnerships, alliances, joint command, or multi-agency missions, a new set of meta-leadership roles comes into play. These roles are different from those in a hierarchical organization where subordinates are required to execute orders or follow management directives and are held accountable for doing so. In joint command efforts, on the other hand, collaboration is peer-based, consensual, and mutual. There are no prior histories for building reciprocity, trust, or transparency. Therefore these have to be created anew over time. Moreover, as the leadership role is more one of governance than of command, the issue becomes how to cooperatively develop metrics and protocols that respect the integrity of each of the respective organizations.

That being said, creating new meta-networks is much the same as creating any peer networked organization, except that the units are significantly larger and each has its own distinctive culture. Accordingly, certain leadership roles have to be established for all

83 Baker, Wayne. *Achieving Success through Social Capital*. Ann Arbor, MI: University of Michigan Business School. 2000.

84 Gerstner, Louis. *Who Says Elephants Can't Dance*. New York, NY: HarperCollins. 2002.

participants—specifically, what behaviors or traits best exemplify the qualities and standard being sought of the meta-network. Since leadership in joint efforts typically rotates over time, exemplar leadership roles should be filled by those who have qualities that are not closely identified with any one particular organization or Service. Rather, an effort should be made to give this networked organization its own independent identity. An early visionary can act as the exemplar member and personify the desired qualities, thereby setting a precedent for others to follow. However, there should be an effort to identify other network leadership roles and the associated metrics and protocols that the different representatives of the joint organizations would undertake.

This networked approach to joint leadership differs significantly from the traditional, hierarchical Napoleonic staff codes wherein a small number of fixed staff with limited specialization perform most of the joint leadership support functions. The networked approach more closely resembles former Marine General Anthony Zinni’s proposal for a Modular Commander Center, which stresses specialization and flexibility.⁸⁵ As a former CENTCOM commander, General Zinni recognized that commanders had variable missions requiring combinations of different functions, resources, and partners. In effect, the command structure had to be agile enough to adapt to the different circumstances of the mission from unilateral humanitarian missions to coalition-based major combat. The combinations of skills for each differed significantly and therefore would entail specialized social network protocols and combinations of different network leadership roles and skills. Under such conditions where it is difficult for one coalition partner to exert authority over another, as many of the organizations are sovereign and independent, the only form of effective control is the selective exclusion of partners or the minimization of their role. The qualities of the “connector” and the “facilitator” network leadership roles are especially important at this senior level and have their own specialized “social protocols” and skills for setting and coordinating joint missions.

⁸⁵ See: Alberts and Hayes, *Power to the Edge*. p. 156

Leadership and scope of control

In hierarchical and bureaucratic organizations, leadership is often confused with scope of control and authority—power. In such organizations leaders are given the latitude, even the expectation, to exercise significant control at all levels of the organization. This is often expressed in budgetary terms: the willingness and the ability to control, cut, or redirect a subordinate’s budget. The power of a superior is virtually absolute in such organizations as they have the authority to project control all the way down the organization. There are no autonomous layers, and in this sense, decision rights are not protected but revocable and alienable. Usurping local control and autonomy through top-down budgetary restrictions can undermine the efficacy and self-organizing capabilities of an organization and thereby prevent it from effectively learning and adapting. The integrity of local rules and allocation protocols have to be maintained, and while there can be a decrement in the gross resources available to a subordinate or sub-network, these resources should not be explicitly earmarked or constrained, as such interventions will prevent the network from being self-organizing. This is the same type of issue as the requirement for tactical autonomy in a command system, where the super-ordinate strategic layer determines the objectives and the assets to be allocated, but the lower-level commander has the authority and the responsibility to make the tactical decisions.

In a networked organizational model where there are also independent layers of self-organization and different types of protocols for interaction, the transecting of layers by a super-ordinate to a subordinate, in effect, micromanaging and second-guessing, is dangerous for the well-being of the network. It transforms a collective, networked asset into an episodic individualized asset, thereby undermining trust and accountability. This may happen out of frustration by a senior manager wanting to get things done and going outside official channels. However, in every case it undermines the collective capability of a networked organization to self-organize.⁸⁶ For this reason, it is very important to move away from the individualized model of leadership and authority and to develop governance mechanisms that build up the overall ongoing assets of the networked

⁸⁶ For example: Daniels, Aubrey. “The Dangers of Micromanagement.” Entrepreneur.com. February 4, 2002. <http://www.entrepreneur.com/article/0.4621.296886.00.html> (Feb 2004)

organization. Network leadership roles that are held accountable to the interests of the whole will yield far more efficient, effective, and accountable organizational structures than those that are governed through sporadic and episodic interventions that undermine local authority.⁸⁷

Social currencies and senior leadership

One of the innate social exchange algorithms that all people seem to have is the ability to trade favors in order to build social relationships and systems of mutual obligation.⁸⁸ In the traditional societies long-studied by anthropologists, this is manifested in gift exchange systems where social obligations are created and repaid through the exchange of gifts.⁸⁹ Even without a physical accounting of who owes what to whom, people are very proficient at keeping score, not only in terms of knowing how much is owed, but what is owed—favors, goods, payments, or special privileges. The exchange of gossip is a very powerful “social glue” and plays a vital role in keeping a group together and informed of the status of its members.⁹⁰ Different social groups have different systems of exchange, different kinds of tokens—what we call *social currencies*—for creating affinities, building relationships of mutual advantage, and enabling the valuing and trading of different kinds of skills, privileges, and goods. In other words, people in social and work networks create their own markets around their particular skills and resources and use these transactions to build social cohesion and trust within and across social networks. Social currencies are typically denominated in the types of skills and resources that define a social network. For example, in some *professional* networks (medicine, law, and consultancies), the prevalent social currencies are knowledge, expertise, and access to important events and people; in other *social* networks, social status and privilege of membership can be the principle inducement.

87 Mochal, Tom. “Balance accountability with authority through effective communication.” *TechRepublic*. September 10, 2001. <http://techrepublic.com.com/5100-6330-1027972.html> (Feb 2004)

88 Dunbar, *Grooming*. p. 72.

89 Hyde, Lewis. *The Gift*. New York, NY: Vintage Books. 1979.

Mauss, Marcel. *The Gift: Forms and Functions of Exchange in Archaic Societies*. New York, NY: Norton. 1967.

90 Dunbar, *Grooming*. p. 112.

In many cases, the social currencies that fuel the many informal networks that make up businesses and formal organizations are often more powerful than other more traditional forms of inducement, such as financial incentives. Indeed, most large organizations are made up of peer networks of constituencies who, by virtue of shared skills and mutual interests, act more on the behalf of their network than for benefit of the overall organization. Members within these networks realize that their peer relationships have more influence over their future success than the formal organization or enterprise. Successful senior leaders, for example, know what the currencies are for such peer networks and they know when and how to cash in their chips to advance their interests and those of their peer networks. This kind of behavior is often dismissed as politics, and when undertaken in an opaque, self-serving, and episodic manner, can completely undermine the trust and efficacy of an organization. Nonetheless, it is through such shrewd negotiations that truly effective and credible senior leaders arise, and it is as natural as breathing for most accomplished senior leaders.

These senior leaders, however, tend to combine for a variety of leadership roles, with particular emphasis on connector leadership skills. They tend not to be visionaries or truth-tellers, who by bent of personality can be so committed to their vision and truth-telling that they fail to build the requisite social capital with their peers to advance to more senior levels. Examples in the military are Billy Mitchell, George Patton, and John A. Boyd. The leadership roles that emerge under these circumstances are the connector, fixer, and facilitator. Such leadership roles seem better adapted to reading and responding to complex social signals and building the requisite social capital to assume senior leadership roles. In this camp, one would find Dwight Eisenhower, Omar Bradley, and George Marshall. Only under the rarest of circumstances do you find military leaders who combine visionary roles and skills with those of the connector, exemplar, and fixer: Lord Nelson, Duke of Wellington, Carl Phillip von Clausewitz, Otto von Bismarck, and George Marshall. The challenge is not to eradicate such behavior, but to harness it by making the coining, exchange, accrual, and cashing in of social currencies wholly transparent and driven by criteria that support the mission and capabilities of the entire organization.

One of the most ubiquitous and natural of social currencies is reputation. It is not surprising that it is the driving force behind so many different Open Source and peer production networks. Individuals can have multiple reputations and a reputation in one field may not be easily transferable into another, because reputation is highly context-specific and subject to the conditions of local rules. Nonetheless, just as trust can be transitive—e.g. I trust whom you trust—especially if it is predicated on strong ties established over long periods of time, so can reputation be transitive even when circumstances may not warrant it. For example, someone who is a great hockey player may not be a great businessperson, but because of the desire of one group to affiliate with another, reputation points or social currencies garnered in one area are often convertible into another.

Careers can often be built by leveraging a highly visible success in one area of endeavor to a succession of successes in other areas of endeavor such as athletics, business, academia, politics, and public service. The challenge is to trade up and to increase the cumulative value of a personal currency. Great “cross network players” include George Washington, Benjamin Franklin, Henry Kissinger, Ronald Reagan, Arnold Schwarzenegger, and Rupert Murdoch. A remarkable fact is the extent to which high reputation ratings are transferable across domains, especially in the case of “world class” rating where Nobel Laureates, NBA athletes, film stars, media commentators can form a common peer group, irrespective of glaringly different competences. It would seem that extreme high competency creates a peer network of celebrity and achievement.

In terms of building robust social networks that offer the right combination of leadership roles to achieve a larger organizational purpose, what might be good for the individual may not be good for the organization. Visionaries, for instance, may provide needed innovation and achieve significant personal and organizational success through their visions. Yet if such visions are not challenged by truth-teller leaders and held accountable by enforcers, they may result in “false” successes and inappropriate learnings at the cost of the organization’s success. Whereas visionary leaders, on the other hand, would have moved on to other organizations and social networks based upon their proclaimed “success.” Similarly, an excess of truth-telling and enforcement leadership can stifle both

innovation and risk-taking, just as an excess of connector leadership within private firms can result in acquisitions that are neither strategic nor synergistic. According to Professor Jeffrey Sonnenfeld, Associate Dean of the Yale School of Management and head of the CEO Institute, companies tend to go through a succession of CEO leadership roles without a coherent understanding of how they relate to either one another or to the interest of the corporation and its shareholders.⁹¹

A network definition of leadership

One of the great unknowns in the business and organizational development literature is what accounts for great leadership. It is one of the softest areas of the social sciences, having defied rigorous analysis for decades. Yet, leadership is considered one of the key ingredients for the success of any organization. The position taken here is that leadership is both born and nurtured. As we have argued throughout this book, the evidence for the biological and evolutionary basis underlying the personality associated with leadership is compelling and growing. Individuals have innate differential leadership capacities in the same way that they have different mental and physical capacities. These personality traits are some of the genetic variables that evolution periodically and randomly shuffles. But what makes a personality trait—such as the ability to interpret emotional cues, to connect with other people, to detect cheaters, to gossip and trade favors—a property of the social network are the rules that govern how individual members interact and cooperate. In this sense, leadership is a network effect that can result in highly responsive and effective leaders, or contrarily, degrade into kleptocracy or demagoguery.

On the other hand, if networked organizations can be designed that select for certain leadership roles and competencies that can be measured, evaluated, and improved upon, then leadership ceases to be an ineffable quality, but becomes a tangible asset that can be learned, improved upon, and replicated. Table 2 summarizes some of the potential metrics of network leadership that are associated with the eight different leadership roles. These lists are not meant to be definitive, but rather illustrative of how explicit network

⁹¹ Personal communication with Jeffrey Sonnenfeld at Yale CEO Summit, 2004.

metrics might be related to both the definition network roles and the self-management of those rules through the appropriate metrics and feedback.

Network Roles	Signature Pattern	Types of Links	Performance Metrics	Social Currencies
Exemplar	star, asymmetric	inform, challenge, assert	independence, trust, reach, completion rate, reputation	expertise, reputation, trust, access
Gatekeeper	asymmetric, gateway, hub, weak links, power law	invite, offer, uninvite	transparency, independence, completion, reputation	access, information, reputation
Visionary	star, sparse asymmetric, strong ties, weak links	inform, question, challenge, assert	social capital ⁹² , reputation, initiation, reach, trust	expertise, information, reputation
Truth-Teller	dense, sub-networks, strong ties,	question, request, inform, assess, challenge	independence, reputation, transparency, trust	reputation, trust
Fixer	strong ties, weak links, hub, power law	request, offer, question, assess, directive	completion rate reputation, reach	access, goods, services, income, reputation
Connector	symmetric, gateway, weak links, small world	inform, access, invite, offer, request	density, ⁹³ diversity, redundancy, reach, trust	access, favors, reputation
Enforcer	strong ties, sub-network, power law	directives, compliance, request, question	completion rate reputation, transparency, trust	access, favors, reputation
Facilitator	gateway, sparse, GFN	invite, request, offer	completion rate diversity, initiation, reputation	reputation, access, favors

Table 2. Network Properties of Leadership

⁹² See: Baker, Wayne. *Achieving Success Through Social Capital*. University of Michigan Business School Series: Josse-Bass. 2000.

⁹³ See: Burt, Ronald. *Structural Holes*. Cambridge, MA: Harvard University Press. 1995.

Signature pattern

Much of the research on social networks stresses the fact that an individual's role in a social network is dependent upon their structural position in the network. Individuals who act as go-betweens or connectors are typically seen as having a network signature measured in terms of how many other members are linked to them and the directionality of these links. The field of social network analysis is still in its early phases of development, and there are many different types of network measures: density, power laws, hub-and-spoke, small world effects, reach, strong ties, weak ties, stars, sub-networks, clusters, clumpiness, constraints, redundancy, effective size, etc. These measures for the most part ignore the *type* of links and try to derive a description of a network principally from its topology. As Barabasi correctly observed in noting the limitations of his own analysis of scale-free networks⁹⁴ and as Watts noted in his critique of small world effects,⁹⁵ the types of links are very important, as are the rules governing the addition and removal of links. Hence, a description in terms of structure alone is insufficient.

Types of links—tagged

The fact that two parties are only removed by three to six links is no guarantee that one party can access another. It all depends upon the nature of the links. Not everyone can or ever will have access to one another. There are social, cultural, and economic rules that preclude certain forms of interaction. More importantly, for the purposes for understanding network leadership roles, the tagging of the links is associated with the nature of the leadership role. Visionaries' characteristically originate informational links, and, unlike fixers, are not in the business of asking people to commit to completing tasks, whereas gatekeepers are periodically inviting and uninviting people to join a group. The notion of tagged links as discussed here is very similar to Searle's notion of "speech acts," forms of dialogue that people use to get other people to do things.⁹⁶ This is a fertile

94 Barabasi, *Linked*.

95 Watts, *Small Worlds*.

96 Clippinger, *The Biology of Business*.

See also: Searle, John R. *Consciousness and Language*. Cambridge, MA: Cambridge University Press. 2002.

and highly developed field of linguistics—discourse analysis and pragmatics that offer significant promise for identifying the grammars of interactions among members of a social network. There are rules or social protocols for the addition and removal of combinations of such links, thereby making most complex social networks *not* scale-free.⁹⁷

Performance metrics

Given the visibility that being a member of a network provides and the opportunity to track and measure interactions, it then becomes possible to provide relatively simple, straightforward, empirically based measures related to the quality of leadership. For example, a leader should not lose track of people, resources, or projects, but have a high completion rate for the number of commitments or “loops” that he has initiated. Measures can tell how many loops remain open, how fast they are being closed, and who is the bottleneck.⁹⁸ In a world of such visibility, there can be real accountability. Perhaps the initial metrics are not correct and do not reflect true performance. They then could be modified over time through feedback, and adjusted to drive the desired behaviors. As was noted in the earlier analysis of peer-to-peer networks, reputation is a widely shared performance metric and a profound driver of behavior. There are more sophisticated measures such as reciprocity and social capital measures, but every performance measure would have to be adjusted for the particular needs and circumstances of the networked organization.⁹⁹

This can be an important measure because each network and leadership role evolves its own social currency, and these currencies are *relational* measures indicating the status of an individual’s relationships with others in the network. The ability to amass significant amounts of social currencies can translate into effective leadership. The ability to convert from one social currency account into another can greatly facilitate a leadership role, such as a connector or a fixer. This is an important dimension of network interactions and needs to be understood in order to direct overall network behaviors.

97 Barabasi, *Linked*.

98 For examples of such measures, see: Burt, *Structural Holes*. Watts, *Small Worlds*. Baker, *Achieving Success*.

99 Baker, *Achieving Success*.

Developing network leaders

Visibility and digitization

As more and more interactions become digitized and observable, opportunities abound for using the naturally occurring metadata about the volume and the nature of the interactions among members of network organizations. Collaborative technologies, as simple and ubiquitous as e-mail, make it possible to make visible the millions of social interactions among the participants in networked organizations and thereby gain insight and eventual control over how members manage their work relationships. Not only is it possible to capture metadata about who is interacting with whom, but it is also possible through analytics to identify some of the emergent network leadership roles. Simple modifications to existing collaborative platforms make it possible to identify the network signatures of different types of leadership roles. By making different members' behaviors visible to one another, and by developing metrics for rating leadership performance, many of the techniques that are used in peer production systems—Open Source, eBay, and even MMORPGs¹⁰⁰—can be applied to the self-synchronized management of networked organization.

For example when setting up multi-functional or cross-organizational teams through email, it was possible for all the members to see who communicated with whom about what topics and how frequently. A new kind of self-enforcing accountability could be introduced. Furthermore, by providing metrics of responsiveness, connectedness, loop closing, and peer ratings, not only would shared awareness be increased but new forms of self-synchronization would emerge.

As more data on the interactions of social networks becomes available, it should not be too long before network leadership roles are identified in much the same way that different roles were identified in online games and peer production systems. It is just a matter of time before network leadership roles become digital, and by virtue of their becoming digital become measurable, teachable, and systematically deployed to maximize network performance.

100 Massively Multiplayer Online Role Playing Games (www.mmorpg.com)

Identify performance metrics for network leaders

Social network analysis has identified some of the preliminary network structures associated with different kinds of leadership roles, such as the importance of connectors and hubs in network organizations, or how small world effects can be achieved. With the advent of *social software* to manage social interactions, form ad hoc groups, close decision loops, and enable self-synchronization behaviors, leadership qualities that had been unmanageable intangibles for so long can be measured, improved, and taught in a way that was never before possible. With the wide-scale adoption of RFID and mote technologies for tracking physical assets in real time, and the enormous strides in information sharing, improved awareness, collaboration, and self-synchronization demonstrated by the war in Iraq, the time is not so distant when leadership roles will be measured and tracked digitally and become an integral part in how networked organizations are managed. These cumulative innovations will significantly reduce agency costs and improve the flexibility and productivity of large-scale organizations by orders of magnitude. New metrics will make it possible to measure the degree of trust, reciprocity, successes, failures, social capital, diversity, network value, etc. within an edge organization. By making all assets—physical, human, content, and interactions—observable and providing for the selective disclosure of information and the dynamic allocation and revocation of security access, it will be possible to have much more secure and robust networked organizations.

Career paths

In order for new models of network leadership to be adopted and become an integral part of networked organizations, there have to be clear career paths that reward the skills of network leadership as a recognized part of career development. In military organizations where the alpha leadership role is still wedded to certain traditional combat roles (the fighter pilot, the Navy Seal), identifying new alpha roles that exemplify important and valued competencies outside those of the traditional military culture could prove challenging. In forms of warfare that are increasingly informational, analytic, sensemaking, and collaborative, communication and interaction skills are becoming

increasing important. New kinds of competencies will be selected and need to be rapidly incorporated into the training of all recruits. By having explicit, real-time measures not only of important leadership traits but also the demand for different types of leadership roles, human resource departments will have an easier time not only in developing credible and practical work performance criteria, but also in anticipating the demand for current and new types of leaders and skills. As suggested earlier, through the real-time content analysis and tagging of messages, primarily email and instant messaging, it would be possible to differentiate visionary leadership roles from truth-tellers. The analysis might reveal a dearth of truth-telling interactions and that visionary-type communications dominate the interactions within the social network, leading to bad decisions and failed missions. Individuals could be evaluated in terms of how well they are able to fulfill different network leadership roles and recommended for the roles that they are best suited for. As Table 2: Network Properties of Leadership illustrates with its Performance Metrics column, there are specific metrics associated with different types of leadership roles and these measures could be derived from naturally occurring metadata that are the byproduct of email interactions.¹⁰¹ Given these capabilities in the future, not only could there be a “real-time inventory and stocking system” for leadership skills and roles, but real-time systems for evaluating the performance of human assets and knowing when to replace or upgrade them. Such metrics will also be used to conduct forensic analyses of different missions where there have been leadership successes, failures, or the need for new kinds of leadership roles or combinations of roles. Given the explicitness of the leadership models, lessons learned from one networked organization can be rapidly applied to another, thereby accelerating organizational learning and innovation adoption.

Conclusion

Like the “nature versus nurture debate,” the “born versus made” leadership debate is based upon a false dichotomy. Just as genes interact with the environment to express unique physical characteristics and capabilities, so too is the quality of leadership an expression of how innate personal characteristics interact with organizational factors.

¹⁰¹ The content analysis of messages and text and the rating of these messages in terms of some marketing or expertise category is being undertaken by a variety of companies and services today. www.technorati.com, gmail for www.google.com, and www.tacit.com for corporate email.

Given this perspective, leadership is not regarded as the random occurrence of great men at moments in history, but rather as a network effect, the interaction of innate traits, themselves long nurtured and refined by evolutionary forces and the organizational context in which these traits are expressed. In other words, great leadership is the combination of individual traits and historical and institutional contexts. This is powerful knowledge if we can learn to identify the types of roles needed to guide a group or an organization in a certain situation, and then find the right person for the job. An important task in the coming years will be the training and testing of future leaders.

Chapter Eight

Value Creation

Introduction

The real power in edge organizations will be based upon the talents, skills, and values of people, some as individuals and leaders but many as team members, partners, and collaborators. As hierarchies evolve into flatter and leaner organizations, the real value of the organization will be in its peoples' abilities to work together to achieve more than any individual or segregated group could. In this chapter, we explore how new forms of organizational value can be created by overcoming the limitations of hierarchies and creating peer networks that can be self-synchronizing and yet highly effective at different forms of knowledge production. Peer networks can have lower transaction costs and are better able to identify and organize diverse talents and skills than conventional hierarchical organizations.

Peer production networks

Yochai Benkler,¹⁰² a noted legal scholar on contracts and the Open Source movement, offers one of the most comprehensive and thoughtful analyses of the social contracting costs and organizational efficiencies of peer networks, or what he terms *peer production*. Drawing upon Coase's analysis of agency and information transfer costs, Benker argues that knowledge production is best achieved in a peer network.

As human intellectual effort increases in importance as an input into a given production process, an organizational model that does not require contractual specification of the effort to participate in a collective effort and allows individuals to self-identify for tasks will be better at gathering and utilizing information about who should be doing what than a system that does require such specification.... The point here is qualitative. It is not only, or even primarily that people can participate in production. It is that the widely distributed model of information production will better identify who is *the best person* to produce a

102 Benkler, Y. "Coase's Penguin, or Linux and the Nature of the Firm." *Yale Law Journal*. No 112. Winter 2002-2003.

specific component of a project, *all abilities and availability to work on the specific module within a specific time frame* considered.¹⁰³

Benkler then goes on to argue that at the heart of peer production systems such as NASA's Clickworks, Xerox's Eureka, the Linux Open Source movement, Slashdot, and Kuro5hin are sophisticated collaborative platforms.

The value of these systems is precisely in enabling the underlying agents to use extensive information exchange and feedback to provide the same desiderata that prices and managerial commands provide in their respective models. The platform design and maintenance, and more importantly the human attention required to take in and use the information, are the equivalent for peer production of organizational/decision costs in firms and of transaction costs in markets.¹⁰⁴

Seen from the Coase's framework, collaborative platforms for sharing such as Notes, eRoom, Groove, and Sharepoint are like the classic model of the hierarchical firm, whereas peer production networks are more like markets that self-organize and synchronize using local information. Social exchange theorists¹⁰⁵ have argued that markets are a special case of social exchange protocols and do not distinguish between the exchange of economic goods and the social exchange of other goods, such as favors, information, and reproductive rights. The difference is in the type of the social protocols that regulate the decision rights and thereby affect the social contracting costs. There is no inherent reason that the social contracting costs of exchanging non-economic goods—or incompletely understood or priced goods—cannot be achieved very efficiently through social exchange networks using socially prescribed roles and tags. Indeed, that is what most traditional cultures do through their kinship and gift exchange systems and most organizations do through their informal networks.¹⁰⁶

The paradox

Given the evolutionary success of peer networks in nature, why is the preponderance of formal organizations still hierarchical? Why are most management and military practices

103 Ibid.

104 Ibid.

105 Cosmides, Leda and John Tooby. *Evolutionary Psychology: A Primer*. Center for Evolutionary Psychology. Santa Barbara, CA: University of CA. 2002.

106 Lesser, Eric ed. *Knowledge and Social Capital: Foundations and Applications*. Boston, MA: Butterworth-Heinemann. 2000.

based upon traditional views of command and control? Why are managers or commanders so resistant to relinquishing any form of overall control? The pervasiveness of hierarchy would seem to contradict key points made earlier, such as that hub-and-spoke networks gridlock decisionmaking and do not scale. Resolving this paradox is critical to implementing any significant change in collaborative practices. In our earlier discussion, Dunbar made the point that people cannot effectively manage over 150-200 relationships. Once an organization exceeds that threshold, hierarchical controls become necessary. That is one possible answer.

Another answer is that within small peer networks, limited hierarchy is both efficient and highly rewarded. Most species self-organize their peer networks around alpha members who historically exemplified defining traits and behaviors such as reproductive fitness, hunting and protective prowess, and sociability. Within such peer networks, alpha members are accorded special status and rewards, and therefore alphas naturally resist any challenge to their authority. Managers like alpha leaders identify more with their peer network than with the more abstract goals of the larger organization. Consequently, they are less likely to be managed from above or below, but rather through those peer networks of relationships and roles upon which they have depended and expect to depend. Militaries have long understood this and have carefully exploited a soldier's willingness to sacrifice and fight for his peers to achieve broader military or political goals. As Brigadier General Thomas Druade, USMC, narrated in a Vietnam War documentary, "Marines don't fight for their country, and they don't fight for the Marine Corps. They don't fight for apple pie, motherhood, Sally Lou, or Lost Overshoe, Iowa. They fight for their buddies."¹⁰⁷

Hierarchies are ineffective for controlling collaboration across diverse peer networks. In such cases, hierarchical control entails imposing the criteria of one network on another, and therefore is intensely resisted by the subordinated networks. As a result, the evolutionary stable strategy of altruistic reciprocity is often displaced by highly

107 Magnolia Series Number Four. "No Greater Love: Roy Wheat in Vietnam." Director Charles Sullivan. 1992. For more information, visit the U.S. Marine Corps Library: <http://www.lib.usm.edu/libraryfocus/spring00/rmwheat.html> (Feb 2004)

competitive, zero-sum retaliatory strategies resulting in the high agency and coordination costs so typical of formal bureaucracies.

While peer pressure is highly effective at enforcing norms or protocols within peer networks, new norms and protocols are needed to enforce the norms of behavior (protocols) across different peer networks. This is where Searle's X-Y-C rule is invoked and where the ability to construct new conventions and protocols is paramount. The key to making these protocols effective is that they be governed by a separate and independent layer, very much like the TCP layer of the Internet that operates off of the metadata of the IP (lower) layer. Like a symbiotic relationship between two species, the higher layer lives off of the metadata—global information—produced by the lower layer, and in turns ensures the overall performance of all the peer networks without inserting itself into the operations of each of the peer networks. Through new ways of tagging, routing, and synchronizing the interactions of multiple peer networks, TCP/IP networks are illustrative of the type of management and governance architectures that might be feasible for creating scaleable collaborative organizations. At the moment, eBay is the poster child for this approach. However, with the mounting momentum of XML Web-based services now being developed by IBM, Microsoft, HP, Sun, and others, there will soon be organizational successors to eBay that will perform with the same kind of flexibility and robustness and open the way to new forms of highly scaleable collaborative networks.

Engineered openness: Protocols

The most compelling existence proof of effective, scaleable peer networks continues to be the TCP/IP network protocols of the Internet. These protocols solved a huge problem in (what seemed at the time to be) a wholly counterintuitive manner. How do you create a highly reliable, robust, and constantly evolving network out of unreliable components? How do you build a global network that anyone can arbitrarily add millions of devices and thousands of hosts onto without there being a centralized control or global notion of what a best route is? Again, the answer is local cues and independent layers of protocols, feedback, and ratings of “best effort” routing performance. It is a network of networks wherein each network is its own world and knows very little about other networks. What

makes the Internet network so successfully are the high-level governance protocols that reward and punish independent networks on the efficiency of the different routes they use to get a message to its destination. Like networks in nature, it is not a huge hub-and-spoke network, but a network of peer networks where protocols are the real keys to success.

Collaboration as routing

Given the wealth of new scientific evidence on the nature of social networks and collaboration, it is not surprising that the current generation of collaborative technologies have not lived up to expectations. They were based upon a false and largely unexamined premise about sharing. On the other hand, if collaboration is regarded as *routing* among networks of peers and control is distributed and local, then the conclusion is quite the opposite. With a new generation of peer production collaborative platforms, large organizations are potentially poised for unprecedented productivity.

One of the barriers to achieving this vision of collaboration and management is that most knowledge transfers and interactions are still not fully digitized, and hence are not easily measurable and traceable. Given the absence of such metadata, there can be no effective feedback, and consequently the conditions needed to create the requisite transparency, accountability, and trust do not emerge. When these conditions do arrive, and the right kind of local information is present, then it will be possible to have a distributed self-enacted management process—self-correction, self-enforcement, self-organization, and self-synchronization. As new variants of grid and Web services take root in enterprises over the next few years and metadata becomes an accepted fact of life in managing supplier and customer relationships, the notion of collaboration as routing and self-synchronization will displace the current sharing and command and control models, thereby leading to far more flexible, productive, and efficient large enterprises.

Professional peer networks

The previous examples showed how digital technologies could be used to scale trust as an effective principle of self-organization and governance. In this example, we want to briefly look outside the technologies to familiar examples of forms of social organization

that are peer-based and self-governing, specifically professional peer networks such as medical, professional, and legal partnerships. In these examples, we see many of the same types of social technologies evident in the Open Source and peer-to-peer network examples, that is, the importance of peer evaluation, strict and public criteria for membership, ranking, referral and cooperation, and accountability to the commonwealth of the profession. Every such network depends upon a certified set of skills and demonstrated competencies and most have grades of certification—either explicit or implicit—that govern access to and the distribution of the resources and privileges of the group. Trust is explicitly tied to the demonstrable competencies of the members and mutual self-interest; in effect, the goods of the commonwealth are narrowly defined around the skills, services, and economic interests of the profession.

What is of special interest here is how professional networks identify, qualify, augment and protect their specialized expertise. Unlike open networks, professional networks derive their *raison d'être* and legitimacy from their claim of preeminence in specialized forms of knowledge. In principle, they should be more adept than networks of laymen at solving highly specialized problem in their domain of expertise and in identifying the individuals who can provide specialized information or services. Moreover, most professional networks are not hierarchical and most professionals from academic, consulting, medical, accounting, scientific, and legal organizations abhor any attempt to impose hierarchical controls. They strive to be collegial and, not surprisingly, have a difficult time scaling beyond 150 peer members. In those cases where they do, there are strict designations of levels of privileges and rankings—from associates to partners to senior partners, from interns to residences to physicians to surgeons. Unlike the previous examples we cited such as eBay and the Open Source movements where behaviors are very visible and performance routinely rated, many professional networks demand transparency and accountability of only certain members. Given that they often have an opaque property rights regime, especially with respect to subordinates, they are not particularly good examples of self-organization for NCW. Where they do distinguish themselves, however, is in the manner in which they differentiate their respective network roles among their peers.

In this respect, professional networks seem to naturally exhibit many of the principles of network roles that researchers have found in social networks ranging from primates and other social mammals to naturally occurring social networks in a wide variety of cultures. As we have seen, individuals tend to specialize in a variety of network roles, such as gatekeepers, connectors, enforcers, and truth-tellers.¹⁰⁸ In rare cases, one individual can embody all of these roles, but typically as the network becomes larger and more diverse, professions tend to specialize not only in a knowledge domain, but in their network roles as well. In medicine, the ability to make a referral and have that referral honored is an emblem of power and standing within the profession because not only is a member controlling access to scarce resources, he or she is also enhancing his credibility through the quality of his referral. Knowing who is good and who is bad and being in a position to establish the criteria for rating colleagues and subordinates is one of the principal means by which one advances within a professional network, whether it be in medicine, academia, law, or other professional services. This power and privilege is not readily assigned to the commonwealth within the professional services, but often is implicitly appropriated by senior members, and therefore is a common source of conflict. For this reason, professional partnerships of any scale are not noted as high-trust organizations and can have very high internal transaction and coordination costs.

The lessons for network-centric operations are multiple. Returning to the Marine Corps emphasis on “trust as the cornerstone of cooperation” and the imperative to “decentralize execution planning to the lowest possible levels so that those who must execute have the freedom to develop their own plans,”¹⁰⁹ it is clear that there must be a mutual accountability between seniors and subordinates and that the more tiered an organization is, the less trustful and agile it is. Combat operations entail clarity and accountability with explicit, succinct, shared mission objectives. Therefore, it is not difficult to see how when highly effective and trusted combat officers are placed in administrative jobs, as one former Navy Seal and Rear Admiral put it, “they have a hard time looking at themselves in the mirror each morning.” They feel uncomfortable and out of place. Organizational

108 Gladwell, Malcolm. *The Tipping Point: How Little Things can make a Big Difference*. Boston, MA: Little Brown. 2000.

109 Command and Control. Marine Corps Doctrinal Publication 6 (MCDP 6). 04. October 1996.

layers not only create inefficiencies, they engender distrust and disaffection. As more and more network-centric operations come to rely upon dispersed and complex intelligence and coordination tasks involving diverse and unknown players, it becomes a matter of some urgency that the cumbersomeness of old bureaucratic habits not be allowed to overwhelm the promise of NCW flexibility and responsiveness.

Conclusion

This chapter showed how it could be possible to overcome the limitations of hierarchical organizations by creating more agile and self-synchronizing peer-based networked organizations. Such networked organizations have lower transaction and coordination costs and adapt more rapidly to changing conditions. Through a number of key mechanisms such as peer interactions, peer ratings, swiftly and fairly enforced regulations, and absolutely clear lines of accountability, strong teams can emerge within an organization that operate with high levels of trust, communication, support, and most importantly, effectiveness. These are the high-value teams of edge organizations.

