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Simple and Complex Organizational Forms: Markets, Hierarchies, and Networks in an 'Organizational Triangle'

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**Simple and Complex Organizational Forms:
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in an ‘Organizational Triangle’^{*)}**

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Abstract: Transaction cost economics explains organizations in a ‘market-vs-hierarchy’ dichotomy. Real-world coordination forms are considered hybrids of those pure forms and thus being on a one-dimensional line between them. This organizational dichotomy is solely based on relative marginal transaction costs. This paper argues that pure ‘market’ and hierarchy, including their hybrids, are an empirically void set. Thus, coordination forms have to be conceptualized in a fundamentally different way. A relevant organizational space must reflect the dimensions of the complex world, such as dilemma-prone direct interdependence, strong strategic uncertainty, mutual externalities, collectivities, and resulting emergent process which in turn leads to institutions of cooperation or to mutual blockage and lock-in. In this paper, we establish complexity and emergent process (institutionalization) as an organizational dimension of its own which generates a third ideal ‘attractor’ besides ‘market’ and ‘hierarchy’. We will call it learned, institutionalized cooperation, or networks. In this way, an ‘organizational triangle’ is developed which may serve as a heuristic device. Its ideal corners and their ideal hybrids along the edges (such as ideal clusters and hub&spoke networks) remain empirically void but its inner space is empirically relevant and accessible. This is tentatively applied to the cases of the supplier network of ‘DaimlerChrysler US International’, Tuscaloosa, AL, the open-source network Linux/Open Source Development Laboratories, Portland, OR; and to the internet networks Wikipedia and Open-Source Car. In this way the Organizational Triangle is considered to reflect what is generally theorized in evolutionary institutional economics.

Introduction

Organizational analysis has to be conducted in a theoretical and conceptual frame that reflects real-world properties of *complexity* such as dilemma-prone direct interdependence, strong strategic uncertainty, mutual externalities, collectivities, and resulting evolutionary process which in turn may lead to emergent institutions of cooperation or to mutual blockage and lock-in.

This is in sharp contrast to only indirect interdependence that occurs in the neoclassical modeling of ideal ‘markets’. Complexity which is ubiquitous in the fragmented and interconnected real world is ‘reduced away’ in the neoclassical representation of ‘markets’ by assuming that the individual agent has so little a market share that he has no impact on the whole entities of supply and demand and on resulting prices, nor any influence on the decisions of his fellow agents. This conceptualization is designed to allow for modeling isolated ‘optimization’ and subsequent ‘perfect’ aggregate outcome through the ‘market’ economy.

This is because mainstream economic theorizing still is bound to, and bounded through, its adherence to the mission to maintain that the ‘market economy’ is the best of all worlds and the end of history. This prevents mainstream economists from fundamentally and fully reflecting complexity and non-optimal, non-equilibrium, and non-teleological *evolutionary process, emergent institutionalization*, and also resulting *manifold forms of coordination* and organization – as long as they stick to the ‘optimal and ‘equilibrating market’. This is also reflected in the mainstream theory of organizational forms which still is basically reduced to the ‘*market vs. hierarchy*’ dichotomy. This approach does not appear appropriate to model complex interaction between individual agents in ‘imperfect’ worlds.

In contrast, the whole universe of economic system structures and processes is reflected in an infinite universe of complex models and dynamics, with complicated orbits even generated already by rather simple model structures (for an overview of complexity structures in economic modeling, cf., e.g., Foley 1998). Neoclassical model structures of ‘market systems’ represent just a very special case somewhere at the fringes of that universe.

In times of global spatial and functional *fragmentation*, de-regulation, and *technological interconnectedness*, direct interdependence and related strong uncertainty (namely initial strong strategic uncertainty), complex decision settings, with *externalities, collectivities* and often *social dilemma* structures, path-dependent and cumulative processes, non-optimal, non-teleological, non-equilibrium, and non-stable outcomes have come to dominate the economy. As said, already simple structures may reflect such real-world

conditions since they often already result in instable equilibria and *multiple attractors* and sometimes in never-ending orbits among them – as long as such modeling takes direct interdependence among agents into account.

Such complex real-world structures also have come to determine *practical forms of coordination* and organizational forms, corporate policies, and also public policies (and even much applied mainstream economic research). This is beyond simple ideal ‘market’ arguing; rather, it reflects not only a dominance of *hierarchical* and *power-based* forms of coordination in the global economy today but also the increased relevance of forms of *informally institutionalized coordination* and cooperation, i.e., *network* forms.

This paper starts with a critical reconsideration of the neoclassical ‘organizational dichotomy’. It will be considered what still can be used of it in a more realist conceptual frame. An ideal ‘market-hierarchy’ dimension may still serve as some organizational baseline. Subsequently, we will elaborate on an organizational dimension that reflects complexity, evolutionary process, institutionalization of cooperation, and resulting network forms of coordination which come ‘cross’ to the baseline dimension. Thus, a two-dimensional organizational space will be established. Its attractor will be ideal, learned, institutionalized cooperation, which in turn provides a new, third ‘corner stone’ of its own, in addition to ‘market’ and ‘hierarchy’. In this way, an ‘organizational triangle’ will be established. While empirically void at its corners and edges, this frame can serve as a heuristic tool to better explore both theoretical and real-world organizational forms. Cases studies will tentatively expose the triangle to real-world organizational forms and will illustrate its applicability to better characterize, allocate, and compare different real-world organizational phenomena and forms.

1 The Neoclassical Conceptualization of Organizational Forms: An Organizational Dichotomy

The basic neoclassical approach to comparative organizational (or allocational, coordinational) forms, according to how R. H. Coase has set the field of “new” neoclassical “institutional” economics, is about *relative marginal (transaction) costs* and corresponding *rational choice of organizational form* according to these very relative marginal costs. While Coase was largely unspecific about what concretely determines relative marginal costs, Williamson has considerably elaborated on this (cf., e.g., Williamson 1993; Pyatt 1978).

In doing so he has somehow, and increasingly, reflected all kinds of complexity, evolutionary, and institution-theoretic aspects, like imperfect and asymmetric information, incomplete and relational contracts, bounded rationality, complex decision settings, forms of trust, etc. (1981, p. 553) In this way, it has again become obvious that hierarchies - and even “perfect markets” - as well as the hybrids of both have to be *mirrored as sets of institutions* emerging from *complex structures* and *evolutionary processes*, and that “markets” and “hierarchies” are unavoidably “embedded” in institutional arrangements.

In fact, what would a “*market*” *without institutions* be? Not even the slightest bidding action would be comprehended by the other agents. This has always been the core of the understanding of “markets” and “hierarchies” in evolutionary institutional economics (s. e.g. Neale 1994).

Similarly, what would an ideal *hierarchy without institutions* be? Nothing than an abstract structure consisting of “top” and “bottom” positions where there is strictly no institutionalized division of labor between “top” and “bottom” agents, i.e. no routine. This means that every single decision to be taken by “top” agents needs to see a different agent (person) in the “top”, and correspondingly also in the “bottom”, positions. Pure hierarchy thus would raise complexity to such an extent that it would virtually be impossible to handle. And why should people cling to being in a “bottom” position and adhere to a rule of obedience? Thus, an absurdly artificial conception of hierarchy would result if institutions would be left unconsidered. This is certainly not held by “new institutional” economists. In fact, the very notion of *hierarchy* as rule-based division of labor between “top” and “bottom” positions *includes institutions* and routines.

Note that the very concept of *transaction costs* may easily blow up the neoclassical one-dimensional organizational space since it may imply *imperfect information* and even *strong strategic uncertainty* and thus *prohibitive*, action-blocking information costs, and furthermore direct interdependence, complexity etc. – as J.R. Commons had elaborated in an evolutionary institutional framework years before Coase (cf., e.g., Commons 1934, Vol. 1, 52-74, 336-42; cf. also, e.g., Groenewegen 1996, 9).

Nevertheless, the theoretical core of neoclassical organizational forms remains unchanged in the transaction-cost economic perspective: comparative marginal transaction costs and related rational choice of organizational form determine the *degree of vertical integration*, or *relative lengths of the value chains* inside and outside the hierarchy, i.e. the relative size of the “firm” vs. the “market” (s. e.g. Williamson, 1967, 126). Particularly, the

static *ideal* “*market*” is still widely held as a *benchmark* in the dimension of organizational forms that is constituted by the degree of vertical integration.

Also, different real-world organizational forms, namely cooperative and network forms, appear just as *hybrids* of pure “*market*” and “*hierarchy*” along the dimension of the degree of vertical integration.

Over all, therefore, the very essence of realist, complex, evolutionary institutional settings with interdependent decision-making, strong uncertainty, dilemma-prone collective-good dimensions, cumulative path-dependent learning processes, potential lock-ins, institutional emergence, multiple equilibria (e.g. high vs. low institutionalization of cooperation), etc., is still not properly acknowledged and theorized. The very essence of institutions - and their evolutionary emergence - thus is not adequately represented in the dimension of the degree of vertical integration/value-chain length (for more detailed discussions and critiques of the neoclassical theory of organizational forms, s. e.g. Delorme 1997; Amin, Hausner 1997; Pitelis 1998; Hodgson 2005). This paper attempts to make the complexity and institutionalization dimension explicit which in turn will allow for a better theoretical understanding and comparative empirical analysis of various organizational forms.

2 Complexity, Evolutionary Process, and Institutional Emergence: Defining a Genuine Institutional Dimension and Organizational Space

If we leave the neoclassical dichotomy as it is, basically defined by *relative marginal transaction costs* and resulting *degrees of vertical integration*, or relative length of value-added chains, and if we *disentangle* it from its obscure and inconsequential references to complexity, evolution, and institutions, it may remain some *reference line*. On this dimension then, “*markets*” and “*hierarchies*” remain “*pure*”, i.e. without complexity and *without institutions*. Together with some abstract continuum of *hybrids* (of lengths of chains or degrees of integration) it remains an *empirically empty* organizational set.

However, we will get away from these pure forms as soon as we consider complexity, evolutionary process, socially learned coordination in dilemma-prone settings, and specifically institutional emergence and institutionalization of cooperation (networking).

Not even the *de-regulated neoliberal “markets” of the real world* are close to or do approach the ideal “*pure market*”; they are *fundamentally different* since they reflect real-world complexity and thus institutional embeddedness. The de-regulated “*market*”, for instance, typically is the largest enemy of a “*market*” with any meaningful “*positive*” working

and effect, because of immanent tendencies towards power concentration, self-destruction, adverse (re-) distribution, trust deterioration, reduced innovation capacity, potential lock-ins, mutual blockages of action, etc.

Similarly, in the *real world* with a fragmented and deregulated environment where information and property rights can not completely be appropriated and much information has assumed a quasi-public good character, even the most powerful *hierarchies* turn out to be incapable to effectively deal with the strong uncertainty involved. Hierarchies thus are forced to downsize while, in a double movement, also have to accumulate *ever more power* in order to maintain some control over their environment that is becoming ever more turbulent. Hierarchical power in the global corporate economy is exerted nowadays through the command over *extensive global supplier networks* (including often public assets and public agencies), in this way often multiplying the number of employees that they command beyond their in-house labor force.

Thus, a new organizational dimension has to be defined to conceptualize real-world complex forms of organization and coordination, and to identify them empirically. This organizational dimension builds upon direct interdependence and direct *interaction processes*, *cumulatively learned* and *habitualized forms of coordination and cooperation*, i.e. *institutionally embedded* markets, “*routinized*” *hierarchies*, and *cluster* and *network* forms emerging from markets and among hierarchies (for the prototype of the evolutionary theory of the routinized hierarchy, s. Nelson, Winter 1982, Chpt. 5; as an illustration, s. *Figure 1*).

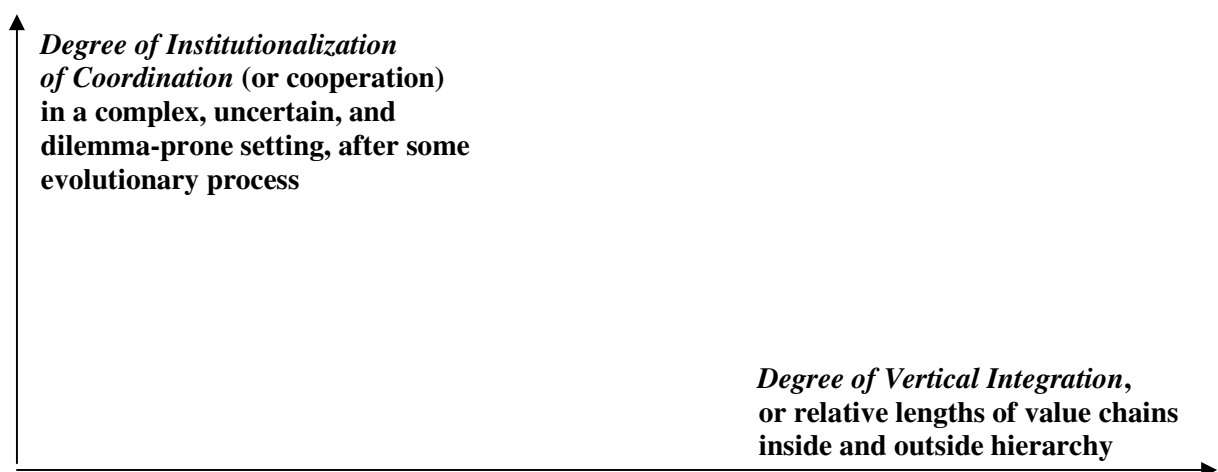


Figure 1: The Two Dimensions That Define the Evolutionary-Institutional Organizational Space.

The new, and again “ideal” (although complexity-based) , corner or attractor point then will be made up by *ideal institutionalized cooperation* which reflects the (“functional” or “instrumental”) collective *solution to complex problem structures and processes* of dilemma-prone decision settings, i.e. an evolving and emerging institution of coordination and cooperation. To be sure, this will not be a morally “superior” or somehow more “desirable” organizational limit point but a reflection of both real-world complexities and emerging organizational phenomena on the one hand and more realistic complex theoretical modeling on the other.

This typically is depicted in *prisoners’ dilemma* supergame modeling (s. e.g., Eckert, Koch, Mitloehner 2005; Elsner 2007) and its embedding in proper *evolutionary “process story”* telling (s. e.g. Dosi, Winter 2000). *Cooperation* is defined in this frame as a form of coordination to solve dilemma-prone collective problems where the dominant incentive to defect can be overcome only by *sacrificing* the potential short-run free-rider extra payoff. This in turn can not be comprehended through short-run maximizing rationality but must assume some rule-basing and “semi-consciousness”, i.e. *habitualization* (for more detail of the description of the evolutionary process and its simple formal logic, s. e.g. Elsner 2007).

“Ideal institutionalized cooperation” also will comprise *information sharing* forms of collectively learned governance, and thus also may include ideal *open-source* structures and governance as some specific real-world cases and as a class of cooperation forms existing mainly in “information economies” (s. e.g. Raymond 1999; De Laat 2004; Eckert, Koch, Mitloehner 2005; Lerner, Tirole, 2002, as examples of a large and still growing literature on “open source”). Again, even emergent open source phenomena would not be expected in this framework to exist as “pure”, ideal forms without elements of hierarchy and “market”.

Note that we are talking of the emergence of *informal institutions* of coordination and cooperation.

In all, within the *two-dimensional organizational space* that may be constructed this way, we can define *three ideal attractor points* (corners). In addition, we assume *continua of hybrids* not only between the two limit points of the neoclassical dichotomy, but also between each two of the three attractor points. In this way, an organizational triangle can be set up in the two-dimensional space. This further specifies, “closes”, and “limits” the organizational space according to theoretical considerations. The *Organizational Triangle* may be considered just another simplification of complexity, but also has to be considered the simplest reflection of complexity which seems to be justifiable beyond the over-simplistic

neoclassical organizational space. As such it may serve as a *heuristic* with respect to real-world organizational forms, i.e. to characterize, *locate*, and *compare* real organizational forms, while reflecting complexity, process, and institutions (s. *Figure 2*).

Against this background, (spatial) *clusters*, for example, are defined here as some *hybrid* forms between (1) informal institutions, reflected by repeated, relatively *stable*, lasting, and relatively price-resistant exchange relations, and (2) spontaneous *decentralized* private interaction systems where prices may play some role (“markets”). Ideal clusters, therefore, will be allocated somewhere “halfway” between “ideal cooperation” and “ideal market”.

Similarly, *hub&spoke networks* are defined here as some more *formal* and *deliberately contracted* forms of multilateral, project-bound, and often fix-term cooperation (often within a temporally larger flow of cluster interactions). Such networks, thus, share their more formal (and hierarchical) character with hierarchies. Hub&spoke networks that have come to dominate the global corporate economy, where big corporate hierarchies command large (global) networks of suppliers and service providers, are the prototype of the fusion between ideal “hierarchy” and (more informally cooperative) “network” structures. They are to be located somewhere “halfway” between ideal hierarchy and ideal institutionalized cooperation (s. again *Figure 2*. Note that we distinguish “networks” between ideal informal hierarchy-free cooperation forms and formal forms with hierarchy. Also note that we do not use the term in the more general sense of initial (spatial) lattice or grid structures, or topologies, as used in complex modeling. For the conceptions and more detailed definitions of clusters and networks and a two-stage model of cluster-network development, cf. Elsner 2000, 2005).

Also, if the neoclassical “baseline” corner “Ideal Market” could be understood as an *atomistic* structure under perfect knowledge then, for instance, cars could be produced just with a telephone by which the entrepreneur would conclude thousands of *spot contracts* (with realtors, construction people, suppliers, laborers, etc.). And if “Ideal Hierarchy” (without “markets” and institutions), in contrast, had to be understood as a *monopolistic* global *mega corporation*, embracing the whole value chain (for one good, at least) in its vertically integrated structure, then the “baseline” edge would display somewhere “halfway” something like a “mid-sized” length of value chain (or “mid-sized” vertical integration), i.e. something like an *ideal “market” with medium-sized firms*.

Finally, an ideal, informal, “learned”, cooperative *open-source network* without hierarchy and with no “price-based” exchange would be a specific, although ideal, example of the ideal institutionalized cooperation corner of the triangle.

In this way, the Organizational Triangle can be defined and specified not only through its *two dimensions* and its *three corners* but also through *four ideal reference organizations* three of which are located to characterize the “half-ways” of its edges (s. *Figure 2*).

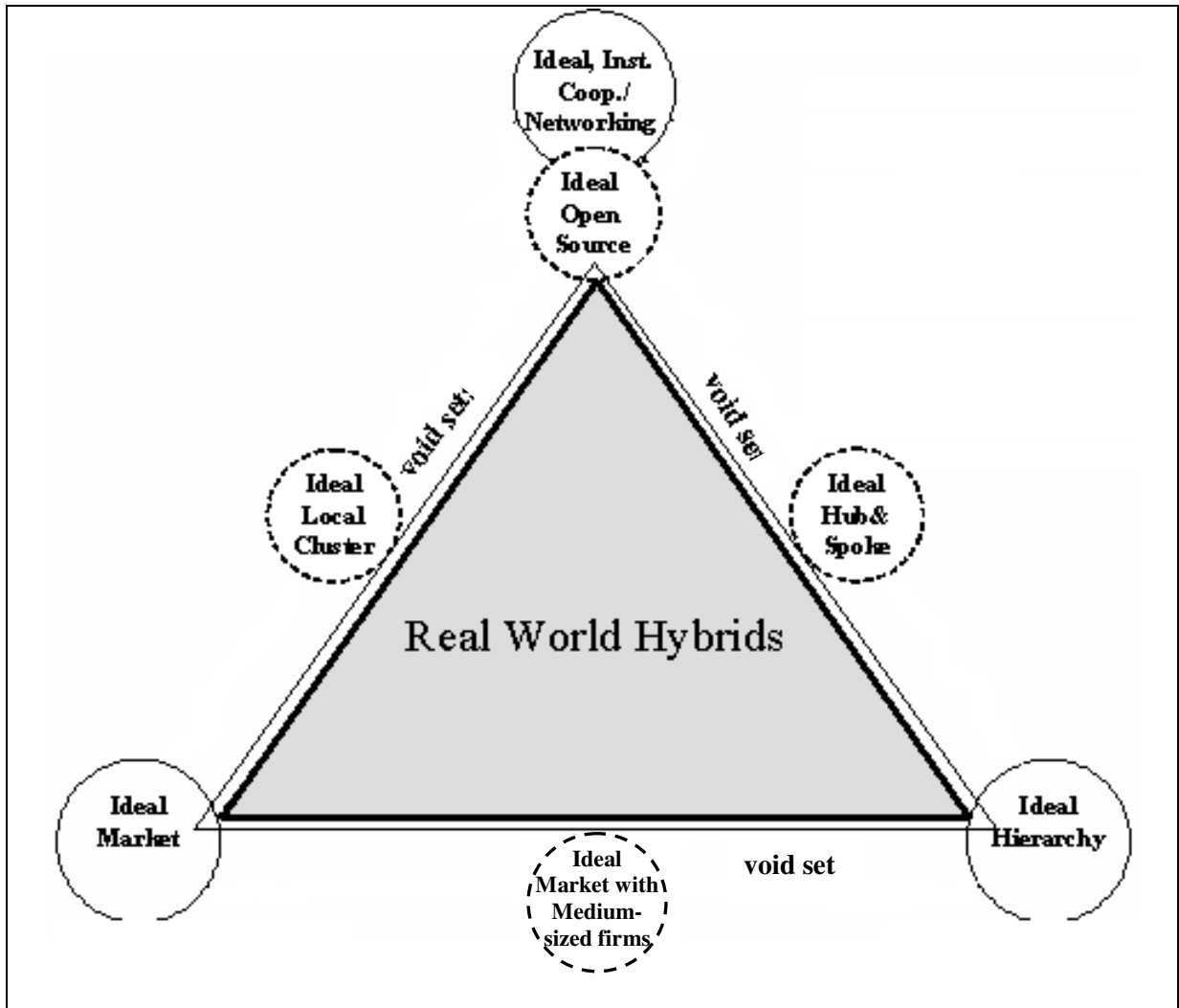


Figure 2: An ‘Organizational Triangle’.

3 Case Studies: Real-World Corporate Hub&Spoke and Open-Source Networks Within the Triangle

This paragraph will tentatively apply the organizational triangle to a real-world empirical phenomenon. It has been outlined before, that in the complex real world, coordination forms have emerged that are driven by other forces and mechanisms than presupposed in the neoclassical dichotomy, and therefore are different from the forms of the neoclassical dichotomy.

For instance, firms have tended to reduce their internal value chains in order to reduce fixed costs (s. e.g. Choi, Hong 2002), but have also tried to deploy the power of large hierarchies to reduce complexity, stabilize expectations and control their environments. Within the neoclassical dichotomy, this would mean reducing and extending the firms' value chains at the same time. Different from this contradictory conceptualization, hub&spoke network forms have emerged that may ensure both a much wider range of resource control (power) at lower costs and dealing with the complexities of information and innovation in more flexible ways (s., e.g., Semlinger, 2001).

Open source networks, on the other hand, are much more driven by learned reciprocity, i.e. the institutionalization and habitualization of forms of voluntary cooperation.

Both new organizational prototypes will be explored a bit more with real-world examples in the following.

We have applied the Organizational Triangle as a heuristic in a first step in a most simple way. In the framework of larger case studies, we have interviewed the CEOs, managing directors and leading experts of the hub firm and its supplier firms of a prominent hub&spoke manufacturing network as well as some leading managers of equally prominent open-source network in the Linux community, in an effort to tentatively apply the Triangle. In a *subjective data* approach, we have surveyed their *self-assessments* of their organizational forms within the space given by the Triangle. Specifically, we have asked a series of questions that are considered to characterize typical interrelations, divided into "structures" and "governance rules", of each of the three ideal forms of the corners. The portions of answers in favor of one of the "corner" forms were related to the number of all answers the interviewees had to give as characterizations of their organizational forms. In a simple arithmetic transformation we have combined the portions related to the three ideal forms into a metric that defines locations on a rough grid in the Triangle. In this way, we have gained some tentative subjective application of the Triangle through some preliminary comparative self-allocations.

Questions in the questionnaire included: Are you happy with the spatial proximity to other network members? How often do you have personal contact with other network members/the hub? Could you name any innovations as a result of this network? The statements have been evaluated according to whether they match with the characteristics of 'Ideal Market', 'Ideal Hierarchy' or 'Ideal, Institutionalized Cooperation/Network'. Each statement clearly expressing a tendency towards one of the three poles counts for one point.

The ratio between the particular answers and the total number of the interviewee's answers expresses the weighting of each tendency. $A(m)$, $A(h)$ and $A(t)$ stand for the number of answers in favor of 'Ideal Market', 'Ideal Hierarchy' and the total number of answers; $f(m)$, $f(h)$ and $f(nc)$ are defined as the tendency towards one of the poles. Values for the contrasting poles 'Ideal Market'/'Ideal Hierarchy' need to be balanced on the related axis. The formulas for the positioning on this axis is as follows:

$$f(m) = \frac{A(m)}{A(t)} + \left(\frac{1 - \left[\frac{A(m)}{A(t)} + \frac{A(h)}{A(t)} \right]}{2} \right)$$

assuming

$$f(nc) = 1 - \left[\frac{A(m)}{A(t)} + \frac{A(h)}{A(t)} \right]$$

and, alternatively, for answers belonging to the pole of 'Ideal Hierarchy':

$$f(h) = \frac{A(h)}{A(t)} + \left(\frac{1 - \left[\frac{A(m)}{A(t)} + \frac{A(h)}{A(t)} \right]}{2} \right)$$

Case 1: A Real-World Hub&Spoke-Network - Daimler(Chrysler), Tuscaloosa, Alabama, and Its Suppliers

The Daimler(Chrysler) production facility in Alabama has been considered a prototype for a long time of a hierarchical network form with a strong hub that exerts direct influence on its suppliers' ('spokes') business policies. In order to reduce complexity through strengthening the density of network interactions, *Mercedes Benz United States International* (MBUSI) is locally surrounded by a most of its tier-one suppliers. It exerts extensive pressure upon them. Exit and entry rules are fixed and governed by the hub – most of the suppliers have been selected by MBUSI's 'Central Purchase' according to their cooperation with Mercedes plants elsewhere in the world. The hub is able to collect information from its spokes without disclosing its own knowledge to them.

Notably, the dominance of MBUSI over its first-tier suppliers is different for different suppliers. The differentials are represented by the *degree of dependence* of the suppliers from MBUSI which in turn is mirrored in the geographical *proximity* or distance of the suppliers' sites to or from the hub's site. Those suppliers located further away typically do not deliver

exclusively to MBUSI. Some are located exactly between their two main customers (e.g. MBUSI and BMW which is located in Spartanburg, SC). These suppliers did emphasize their independence in the interviews stressing that they could also deliver to further customers, e.g. in the Detroit region. Some suppliers' contracts with MBUSI in fact do not restrict them to supply MBUSI exclusively. These suppliers are mostly located beyond a ninety miles circle around the Daimler site, in contrast to most of the other tier-one suppliers that deliver to MBUSI exclusively. The latter are required by MBUSI to settle within a 30-mile-radius around the hub.

The subjective allocation of the MBUSI supplier network in the Organizational Triangle shows a clear proximity to the ideal *hub&spoke* network in the Triangle, as would have been expected (s. *Figure 3*). Accordingly, a majority of the companies interviewed considered their supplier interrelations *hierarchical rather than "market"*. In contrast, as also seems obvious, those suppliers located further off the hub and "half-way" between different hubs (e.g. MBUSI and BMW), and delivering more than one hub, tend to stress "market" rather than "hierarchy".

Case 2: A Real-World Open-Source Network - Linux

In contrast, the Linux network apparently is characterized by relationships among its members that are considerably less based on hierarchy and more on voluntary cooperation and reciprocity. Knowledge flows seem more governed as a collective good. "Instead of remaining in isolated small groups each developing their own ephemeral local cultures, (the Linux community) discovered (or re-invented) themselves as a network tribe" (Raymond 1999, 9) "Linux (...) was (...) casually hacked by a number of volunteers coordinating only through the Internet. Quality was maintained not by rigid standards or autocracy but the naively simple strategy of releasing every week and getting feedback from hundreds of users within days, creating a sort of rapid Darwinian selection on the mutations introduced by developers. To the amazement of almost everyone, this worked quite well" (Raymond 1999, 24). "Consequently, digital microelectronic information has virtually become subject to non-exclusion, rendering information a full-fledged collective good ubiquitously subject to free-riders." (Elsner 2003, 6).

According to the extensive and growing open-source and Linux literature, the network structure is characterized by several hubs that often just moderate the exchange process among the members without being able to put any pressure on them. The network seems to

have launched fast exchange, some joint learning, routinization and institutionalization of cooperation, emerging from “dense” repeated interaction.

Raymond (1999), for instance, has characterized the basics of the “hacker” culture and explained the principles relevant for the open-source success compared to the traditional “closed-shop” culture both in software and traditional manufacturing. “Participants want to learn or build a reputation, they may have a personal need for the software or consider it fun to be involved. In a sense, the influx of these people reduces the need for provision rules. v. Wendel de Joode, R. (2005): p. 82.

Among the individual motivations to cooperate, the building of a “*reputation*” seems to be the most important. The reputation mechanism seems to apply to a large portion of this community. Mailing lists and news sites frequently report on highly skilled programmers who have earned credit. The “reputation” mechanism is a prominent indicator of a long-run rationality in the theoretical framework of the PD supergame, specifically in a stochastic population approach where active partner selection is possible and will be based on individual reputation (cf., e.g., Elsner 2007).

The “Linux-paradigm” thus can be seen as an approach towards “ideal, institutionalized cooperation” in the Triangle space. Obviously, however, as a real-world coordination form it can not be expected to perfectly conform with the ideal. For instance, *hierarchy interferes* with the cooperative network in the sense that an increasing number of private corporations offer open source software services and formerly voluntarily working Linux hackers are being poached by them. Many Hackers have turned their activities into a career within a hierarchy and have started to develop source codes on a *commercial* (“market”) base. Finally, the Linux kernel, basically *privately owned* by Linus Thorvalds, is well managed by a small group of well selected core members of the larger community, with clearly defined *hierarchical competences* to decide over the basics of the further development of the source code.

The Open Source Development Laboratories (OSDL) average shows a tendency towards ‘Ideal, Institutionalized Cooperation/Network’ followed by a tendency towards ‘Ideal Market’. Tendencies towards ‘Ideal Hierarchy’ can be neglected, the only statements carrying any related characteristics reflect the fact that Linus Torvalds watches over the contributions to the kernel and the fact that a limited number of developers exclusively work together for a limited time in order to create a patch to fix a kernel problem before the problem is made generally available.

Many members of local Linux Groups see tendencies towards “Ideal Market” within the Linux network, because most of them know the software industry’s interest in Linux Hackers. Some of them have turned their hobby into a career, while OSDL is founded as a non-profit organization to support the idea of open source.

Cases 3 and 4: Other Internet Open-Source Networks - Wikipedia and OScar

Examples that might come even closer to ‘Ideal, Institutionalized Cooperation/Network’ are Wikipedia and the internet based approach to manufacturing a car ‘open source’, i.e. OScar.

The online-encyclopaedia *Wikipedia* works without any central (i.e. hierarchical) guidance, and everybody can easily add or change his information or knowledge, and someone else can add more or change this again. Also, “commercial”, “monetary”, or “market” factors do not influence Wikipedia. Wikipedia is free of commercial advertisements and is completely based upon the contributions of volunteers who publicly share their knowledge. Due to unrestricted entry and usage, Wikipedia comes close to the ideal of an open-source network.

Since there is no control of contributions it would be likely that the most widely shared knowledge occupies the largest space in Wikipedia, and this would not necessarily be the most correct or cutting-edge knowledge. Accordingly, Wikipedia would represent the average knowledge of the “masses”, including folkviews, ceremonial beliefs, etc. However, preliminary investigation has suggested that compared to a traditional hardcopy encyclopedia, Wikipedia provides more recent, more specific, and more cutting-edge knowledge (*Stern*, No. 50, Dec. 6, 2007).

Thus, with even less hierarchy, central management, and layered “structure” than Linux, and with its apparently high-quality open-source knowledge base contributed by countless and even anonymous volunteers, it appears to be even closer to the ideal open-source informal network structure. We do not attempt a detailed exploration of the Wikipedia phenomenon, nor have applied a questionnaire to members of the Wikipedia community as in the cases 1 and 2. But we do assume that Wikipedia indicates the working of some institution, norm, or culture of informal cooperation, reciprocity, and knowledge sharing.

Therefore, we have tentatively allocated Wikipedia in the Triangle space closer to the ideal informally institutionalized network cooperation (s. *Figure 3*).

The *OScar*-Project builds a bridge between the hub&spoke structure of MBUSI in car manufacturing and the open-source projects in software production and online content production. Different from Linux and Wikipedia, both creating a “virtual” service and

“product”, Oscar can be seen as an attempt to develop a tangible product, a car through open internet exchange. Oscar aims at developing a car without an engineering centre, without a boss, without money, and without borders, but with the help of the collective creativity of the internet community. Based on the voluntariness of engineers, designers, as well as colleges, companies and “hackers” who all voluntarily contribute their time and knowledge. The first prototype is targeted for the end of a period of three years – the same time that multi-billion Dollar corporations say it takes to develop a car. The principles of the Oscar community include guidelines for the interaction between its members, such as “trust is the basis for our cooperation”, “everyone has a voice”, “knowledge is free” or “the intelligent majority decides”. These structural properties and governance rule should qualify also Oscar to be located rather considerably close to the institutionalized-cooperative ideal in the Triangle space (s. again *Figure 3*) (cf. also Honsig 2006; Giussani 2007).

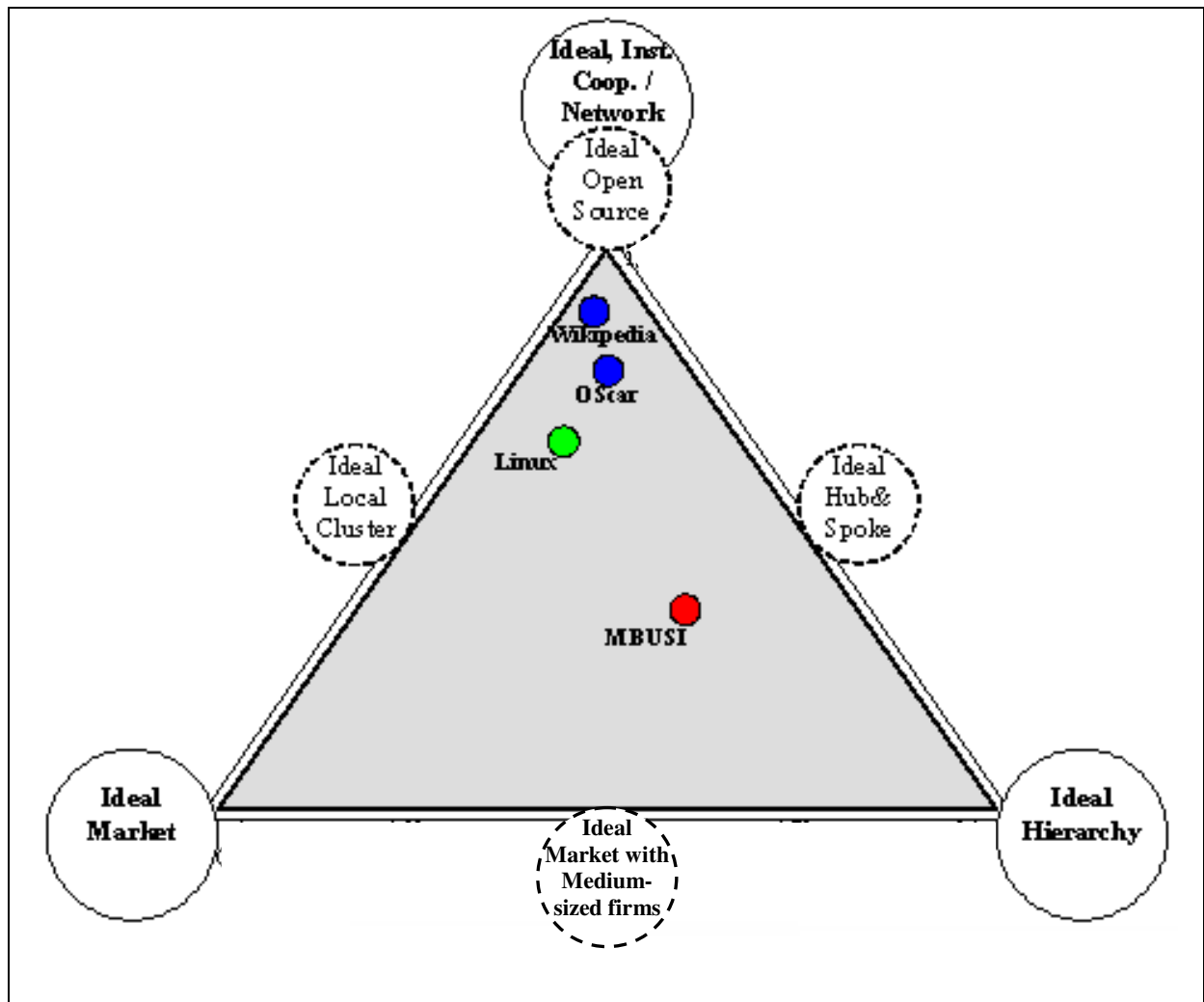


Figure 3: MBUSI, Linux, Wikipedia, and Oscar in the Organizational Triangle.

“Comparative Organization”

Having (tentatively) located real-world organizational forms in the Triangle space, a *comparative discussion* of their specific combinations of properties would be appropriate. For instance, it would be interesting to investigate potential learning transfers for usual hub&spoke large-scale manufacturing networks from internet open-source networks, in order to increase the innovation breadth and speed of the first. The very existence of a manufacturing oriented internet network such as *OScar* (see, e.g., <http://www.theoscarproject.org/>; similar approaches do exist for global shipbuilding can be considered an attempt to transfer the specific advantages of the cooperatively networked open-source information systems, with their reduction of transaction costs, into traditional manufacturing and might serve as a bridging case. Accordingly, global corporate car manufacturing might implement more “open” structures in order to reduce their transaction costs and broaden and accelerate innovations.

For instance, a more “open” approach to communication, i.e. the inclusion of suppliers into developmental processes at an early stage, may initialize and accelerate social learning processes between assemblers and their suppliers, as well as amongst the suppliers themselves, and thus increase product quality and speed up innovation. The intense cooperation between those suppliers of MBUSI, for instance, that were more independent and located more remote from the hub indicates that suppliers indeed are willing to collaborate if they were given the freedom to do so. In face of open-source information within the ranks of a large supplier network a “*speed strategy*”, as is well known from the literature might be the more effective competitive strategy compared to the relative strengths of strongly hierarchical networks.

Daimler’s centralization of sourcing in the Daimler headquarter in Germany may allow economies of scale, but it also excludes the Alabama MBUSI unit from most important decisions like the choice of suppliers. Also, it has been reported by several suppliers that they receive orders not from their own headquarters but from the Daimler headquarter in Germany. This often causes transaction costs and a loss of efficacy since the Daimler headquarter often would not know what really is practicable on-site. A more decentralized and less hierarchical approach in terms of an early inclusion of the local experts both of the assembler and the suppliers thus may support the cooperation and efficacy.

Finally, the project-based contracts applied by Daimler with their suppliers does ease their replacement anytime. However, this again may cause extra transaction costs in terms of

costs of searching potential alternative suppliers and of negotiating contracts with them. *Long-termed contractual arrangements* could lower the transaction costs of changes, reduce uncertainty for all sides, *extend the planning horizons* and thus ease the *learning* processes between MBUSI and its suppliers and among the suppliers themselves.

Conclusion

The Organizational Triangle reflects *complexity*, strong uncertainty, and recurrent interactions, evolutionary *process*, interactive learning, and emergent *institutions* of cooperation, reciprocity, and trust among agents. Thus, it takes real-world problem settings and agents into account. The neoclassical theory of organizations cannot achieve this due to its basic principles as outlined before.

Real-world organizational structures, representative of typical hub&spoke structures in large-scale manufacturing (Mercedes Benz in Tuscaloosa, AL, USA) and of internet-based open-source structures (Linux, Wikipedia, and OScar), have been explored here as examples of the diversity of organizational forms. Their *characterization and comparative location* in the Organizational Triangle has illustrated that real-world structures are indeed *hybrids* of “Market”, “Hierarchy”, and “Ideal Institutionalized Cooperation/Network”. “Markets” and “hierarchies” then are *no longer ideals* but in their very combination with “institutionalized cooperation”, or network forms, have become something different, namely institutionally embedded, multidimensional, more complex, and *empirically accessible real-world forms*.

Therefore, in a global world of fragmented value chains, net technologies and required technological interoperabilities, resulting inappropriability and leakages, and, more general, complexity, uncertainty, etc., the dominant belief in clear-cut stand-alone hierarchies and in firms strategies of ever more *power exertion* to deal with environmental turbulence does not appear to be economically sustainable and not even to be the most appropriate strategy for business. For instance, trying to keep innovations within the boundaries of the firm may be a costly strategy and business model, and nevertheless turn out to be in vain. For MBUSI, for instance, such strategy appeared to cause high and *rising contractual costs*. Despite their contractual arrangements with their suppliers to avoid the transfer of knowledge outside the network it is impossible for them to avoid information leaking.

Comparative location in the Triangle, thus, suggests that taking on *open-source structures and strategies in manufacturing* both within supplier networks and among competing manufacturing networks might improve and accelerate innovation. If the dominant

hub&spoke structures in manufacturing were to profit from open-source structures and strategies then, in the case of car manufacturing, the network *OScar* might immediately grow into the role of a catalyst or bridge-builder, a potential instance of *transfer of new organizational knowledge*.

In sum, we have developed an Organizational Triangle based on, defined and operationalized by (1) *two theoretical dimensions*, the “pure” *lengths of relative value chains* in and outside hierarchies, and the *degree of institutionalization of cooperation*, (2) by three “cornerstones”, i.e. *three ideal organizational conceptions* and “attractors”, and (3) three more *ideal examples* located “half-way” on its edges. *Real-world* organizations, through their very *hybrid* character, then turn out to be something *fundamentally different* than “ideal markets”, “ideal hierarchies” or completely self-governing “ideal institutionalized cooperation”. This is also a reason why the Triangle can be fruitfully *applied to diverse real-world organizations*, as we have tried to briefly illustrate, in order to identify, characterize, and also *compare* these real-world structures. The Organizational Triangle thus may be a fruitful frame to *apply evolutionary-institutional analysis* in the field of organizational forms.

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