

Eli Noam: A company's tools can define its structure

Eli Noam MAY 19 2005

James Boyle: Markets, hierarchies or what

Thomas Hazlett: Corporate structures continue to morph

It is said that dog owners and their pets come to resemble each other. The same mechanism is at work for companies and their information technology. Companies come to look like their information systems. Change the IT and the company changes its structure.

Nobel Prize winning economists have explained the primary function of a company as reducing transaction costs. The higher the transaction costs are, the greater the realm of the company and the smaller the realm of the market.

One can have a company without any production activities but not one without information activity. The company can be seen as a kind of information-processing apparatus, consisting of many nodes. Most of these elements are called people. Human organisations are slower to adapt than computer design, and find modifications harder to accomplish - although eventually competitive pressures and new opportunities bring changes.

Preindustrial companies had a simple structure. The central information-processing device was the owner/operator. Structurally, such companies resembled a person: a head, a set of hands and a few specialised organs. This stage of business was the person model of the company.

In the industrial age, in contrast, the company resembled a well-oiled machine. Each part had its assigned responsibility, and each component was replaceable. A rigid hierarchy and clear process rules governed, and minimised the need for complex information flows. This stage was the machine model.

Following the second world war, the classic company entered its mature stage. Co-ordination and control became big tasks. The central information-processing tool was the mainframe computer. But it was still fairly simple, inflexible, large and vertically integrated. Intelligence was at the centre, and the periphery was connected through dumb terminals. All this resembled the company's structure: a rigid pyramid with middle managers as relays for information up and for decisions down, with little non-routine responsibility. This was the mainframe model.

In the mid-80s, microcomputers began to proliferate, first standalone, but soon connected internally and then globally. Companies reorganised themselves, and the network model emerged that is now becoming the central organisational metaphor and principle. Lower costs for communications, storage and processing meant lower co-ordination costs. Companies could expand in scope and reach. Hierarchy declined and flexibility increased.

And what is next? Among the emerging technology are tools such as ubiquitous computing, human-to-machine communications, sensor networks, automated information screening and semantic networks. Machine-to-machine communications can bypass the human element. All this will generate another fundamental shift. Given these tools, the company will move transactions that were previously internal to the outside. The same technology that reduces the level of internal communications also lowers the cost of external co-ordination. Companies no longer need to own the pieces if they can co-ordinate business elements offered externally by the market at a lower price. And indeed, lower costs have already led many companies to outsource and offshore production activities and, increasingly such functions as research and development, marketing and design.

Many companies then become co-ordinators and integrators; employees become increasingly independent free-agents; a myriad of highly specialised suppliers vie for their services; and customers seek customised services and products. This form of business organisation is the market model of the company. Early examples are semiconductor and consumer electronics companies and Hollywood.

Marshall McLuhan, the media theorist, summarised his view of mass communication as: "The medium is the message. "This can be extended to companies where activity is not just improved by information but its very nature is defined by dealing with it. The driver of change was the shift in the transaction cost for the creation, processing, and co-ordination of information. In the end, the company is as much the product of its chief information technology tool as it is the user of such information. We can summarise our own conclusion as: "The [IT] medium is the company."

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James Boyle: Markets, hierarchies or what?



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Eli Noam raises fascinating questions about the relationship of company structure to technology, but I think he omits the most interesting one. Noam mentions the Nobel prize winning economists who have written on the issue. The principal economist is Ronald Coase whose 1937 article, "The Nature of the Firm" is exactly on point. The central puzzle that article addresses is a simple one. Why are there firms at all in a developed economy? Why not leave everything to the price mechanism and the invisible hand? Put differently, if markets are so great at processing information, why use corporate hierarchy to order such a significant part of our economic life? To answer this question, Coase – like Noam – focused on transaction costs. Vertical integration may be more efficient than the market. At the moment it is not, we will stop making the widget and just buy it.

Fair enough. How does such a framework explain a classic question in information technology and the theory of the firm: IBM's decision to invest so heavily in open source software? Remember, this is software that IBM does even get to own, developed by an army of programmers, most of whom are not employed by IBM. As Yochai Benkler pointed out in an article called "Coase's Penguin", open source appears to fit poorly into the binary opposition between market and hierarchy. Free and open source programmers are not responding to classic price signals in a market. Neither are they cogs in a hierarchical corporate structure premised on control over assets. For a long time the reaction of conventional economics to open source was one of confusion, denial, reclassification or doomsaying. (Richard Epstein's piece in these pages a few months ago is an example of the latter mode.) What can one say to the doomsayers? "E pur si muove," as Galileo said to Cardinal Bellarmine. "And yet it does move."

The easy answer is to say that open source does not fit into the "make or buy" choice because IBM is getting something for nothing. It does not have to pay these other programmers. We now need "make, buy, or get for free" as our choices for a firm! But this would be facile. There are significant costs in investing in open source. This is not just the case of picking up from the pavement the 20 pound note that economics assures us could never have been there in the first place. This is a major investment. Firms that make it have to answer practically the questions academics puzzle over theoretically. Why would such a productive system even exist? How can those who invest in it be sure it will continue to exist? What would Coase say about open source? That is the really interesting question about technology and the theory of the firm. My own guess is that to answer it we need to go back to another set of ideas from the 1930's, to a long neglected school of economists called the "institutionalists" and their insistence that mutuality, cooperation and institutional design were important in ways that the economics of their time had failed to understand. In the last 20 years economists have begun paying attention to institutions again. But the new institutionalists have not fully solved the 'mutuality and cooperation' questions.

Technology lowers information costs. That, as Noam cogently points out, has implications for corporate structure. But it also lowers cooperation costs – the costs of assembling GNU-Linux, or Wikipedia or the web itself. And that, in the long run, may turn out to be its most interesting and, as yet, its least understood contribution.

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Thomas Hazlett: Corporate structures continue to morph



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Eli Noam's whirlwind tour of the corporate structure from cave to computer is delightfully provocative. And it rings the bell when it suggests that firms often become what their IT departments dictate.

This is a great leap forward in some instances, a fatal miscue in others - a proper caveat for corporate strategists, investors, and entrepreneurs. But what is socially most important is the process selecting the business forms best suited to the circumstances of their time. Focusing on the dogs that resemble their owners may miss the complex chain of events leading to this cosmetic convergence.

Take the view of the "institutionalists" that James Boyle usefully introduces for historical perspective. The 1932 treatise by Adolf Berle and Gardiner Means, *The Modern Corporation and Private Property*, argued that separation of ownership and control "destroys the very foundation on which the economic order of the past three centuries has rested." Corporations were doomed to failure, as the managers of such companies would simply steal shareholders blind. The analysis failed, however, to incorporate mechanisms developed by capital markets to encourage debt and equity investors. While less than perfect, they have proven their competitiveness against alternative forms of enterprise. The scale efficiencies of the modern corporation, so funded, have proven vital to every advanced economy in the decades since.

In today's economy, corporate structures continue to morph, reconfiguring private property rights in the pursuit of profits. It is only ironic that IBM would migrate its business model towards software services, and so encourage some products it does not control, under an overly restrictive view of what a corporation is. Look at the vast changes in business organization from the cave to the computer – or just between Windows 95 and the Mac OS X Tiger – and the scope for efficient adaptation is impressive.

And who knows? Perhaps it is profit maximizing to look like your Rottweiler – as mine has pretty much told me, sadly.

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