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The lean core in digital platforms

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Abstract

This paper intends to illustrate and make more explicit the decentralization argument put forward in the literature on platform leadership. The analysis shows that in the digital economy, where rapid scalability and evolvability are so important, decentralization has played a crucial role in the success of some open platforms, as against the failure of other, also open but more centralized, platforms. More specifically, on the basis of four comparative case studies, the paper shows that platform leaders should beware of offering the market too heavy a platform core, lest the platform's neutrality, scalability and evolvability be compromised.

Keywords: Platform leadership; Platform decentralization; Platform core; Platform periphery

1. Introduction

In recent years, product design has become a richer and more complex art than it used to be. In past times, a good product design was simply one that suited well the needs of users. Nowadays, fitting a product to users' needs is almost taken for granted. The leading edge of product design has moved to a set of more strategic and less evident dimensions. Unless a product is very simple and self-contained, 'architectural considerations' will be pre-eminent (Morris and Ferguson, 1993; Miller and Olleros, 2007).

A key element in the new thinking is that of a 'platform'. For the purposes of this paper, a technological platform is the stable, centralized core of a distributed innovation network. Whereas the core can be very tightly integrated, the peripheral elements must be loosely integrated among themselves and to the core (Baldwin and Clark, 2000).

Technological platforms can be proprietary or public. Whereas the former tend to be for-profit concerns, the latter only intend to serve the public good. Some public platforms, like Internet, have emerged from the public commons. Others, like Wikipedia, emerged as private initiatives, but were turned over by their owners onto the public domain.

Technological platforms can also be open or closed. While a closed platform does not reach beyond the boundaries of a firm and its certified contractors, an open platform thrives on non-contractual contributions from independent parties (Olleros, 2007). In an open platform, peripheral players self-select their tasks and terms of work, and rely directly on the market for their reward. This not only taps dispersed knowledge at the source but also greatly increases the design freedom of peripheral players, while freeing core players from a host of burdensome tasks. An open platform thus becomes an ideal vehicle for decentralized innovation.

Open platforms are not intended to offer immediate market value, but rather business opportunity value (Kogut and Kulatilaka, 1994). An open platform is a seedbed for innovation. Whereas a good application is a magnet for users, a good open platform is a magnet for applications, sometimes by users themselves. Whereas an application is supposed to be useful and affordable, an open platform is supposed to be flexible, fertile and accessible: to accommodate and enable many useful applications. While applications may or may not be built to last, open platforms must be built to evolve. They must be scalable and evolvable.

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Not all platforms should be open, certainly not at all times. Likewise, not all open platforms need be decentralized. The degree and timing of opening and decentralization of a platform are the main concerns of a platform orchestrator.

In this paper, I tackle a specific question: when should an open platform be decentralized? After reviewing different arguments for decentralization, I focus on further developing an argument that is hinted at by the literature on platform leadership: decentralization becomes imperative for platforms that need to grow very fast, as is generally the case for digital platforms.

I will argue that in rapidly growing digital markets and communities, platform openness is not enough—an open platform will need to be decentralized in order to be credible, scalable and evolvable. I will also argue that if a platform is to be decentralized, the design of its core is particularly critical, since a decentralized platform can only be built around a lean core.

To back up this argument, I will compare four archetypal and very successful open platforms—the Internet, Wikipedia, the Visa credit card and eBay—with four similar, but much less successful, platforms—Minitel, Nupedia, BankAmericard and OnSale. All four case studies show that the differences in the degree of success had everything to do with the enlightened decision to build the Internet, Wikipedia, Visa and eBay around a lean, minimal core that forced responsiveness, initiative and substantial costs to flow toward the platform's periphery.

The paper has three other sections. After a quick survey of the arguments for decentralization and for a lean core (Section 2), I present the comparative case studies, first regarding public platforms, and then private ones (Section 3). The paper ends with some conclusions (Section 4).

2. The pertinent literature

2.1. The argument for decentralization

The argument for the decentralization of economic processes is based on the dispersion of knowledge, expertise and entrepreneurial initiative at any given time, as well as on the dynamic gains from further specialization and knowledge dispersion (Hayek, 1945). A decentralized market comes into its own as a superior innovation system to the extent that, as a result of profitable trade opportunities, it becomes populated by specialized, innovative agents, thus acting not simply as an efficient allocator of existing knowledge, but also as an efficient generator of new knowledge and selector of new ideas (Buchanan and Vanberg, 1991; Potts, 2001; Baumol, 2004).

Decentralized economic processes, however, are not universally optimal. Time matters in the choice between centralized and decentralized solutions. Centralized processes may yield optimal results in the short term, even though eventually they will run up against their inescapable limitations. Decentralized processes, on the other hand, may take a long time to get their act together, but once they do so, they will likely evolve faster and more optimally than their centralized counterparts. Along these lines, some authors have proposed a cyclical model that makes the degree of decentralization dependent upon the stage of a platform's life cycle. According to them, early in their life cycle, platforms are best kept closed, tightly integrated and centralized. Only later, as uncertainty about optimal product configurations decreases, as complementary markets develop and as critical product attributes migrate from functionality and reliability towards variety and low cost, will it be preferable to open up and decentralize the platform (Christensen and Raynor, 2003; Chesbrough, 2004).

Scale matters too in the choice between centralized and decentralized solutions. Other things being equal, a small scale plays in favor of centralizing processes. Thus, for example, it would be nearly impossible—and quite suboptimal—to try to establish a detailed plan for a new metropolis. But it is possible, and often optimal, to plan an entire neighborhood or industrial complex. Likewise, you may not be able to centralize an entire economy without causing it to collapse, but you can—and perhaps should—centralize an R&D project.

Thomas Malone would certainly subscribe to the principle that, other things being equal, a smaller scale plays in favor of centralizing processes. But he has spent many years arguing that other things are no longer equal, and that the plummeting costs of communications caused by new information technologies have made decentralizing solutions much more effective and attractive than they used to be, irrespective of scale. In a much cited article published in 1987, several years before the Internet's takeoff, Malone argued that new information technologies were reducing coordination costs to the extent of rendering decentralized markets an increasingly attractive alternative to centralized firms (Malone et al., 1987). In a recent book, he updates his argument by, among other things, highlighting the increasing effectiveness of highly connected, but equally decentralized, networks[1] (Malone, 2004).

Something else has changed in the last 30 years. The spread of modular architectures and processes across sectors and regions has also contributed to the fall of coordination costs, favoring decentralized processes not only beyond the boundaries of firms, but even beyond the boundaries of their contractual partnerships (Olleros, 2007). Modularity increases the evolutionary potential of

[1]Five differences between networks and markets stand out. First, markets are primarily coordinated by price signals, whereas networks are primarily coordinated by non-price signals. Second, markets are best at facilitating simple spot transactions, whereas networks are best at facilitating more complex transactions. Third, information sharing often plays a critical role in networks, even in for-profit networks, but a marginal role in markets. Fourth, markets tend to be radically decentralized, whereas networks cover the entire range, from very centralized to very decentralized. Lastly, actors in markets are profit driven, whereas actors in networks may not be.

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a system by making it more flexible and market friendly (Sanchez, 1996; Langlois, 2002), but also more network friendly (Benkler, 2006).

Lean standard interfaces have added new layers of embedded coordination and new degrees of design freedom to the market-based economy. They allow complex systems to structure themselves as open platforms—powerful hybrids with a stable, centralized, and highly integrated core surrounded by a dynamic, decentralized and loosely coupled periphery of complementary products and services. In the best of cases, open platform generate complex, vibrant and open-ended 'business ecologies' (Moore, 1993).

2.2. Platform leadership

The management literature is catching up to these developments. A number of authors are putting together what amounts to a normative theory of decentralization by design. A 'platform leadership' paradigm is emerging[2] (Gawer and Cusumano, 2002; Iansiti and Levien, 2004). It seeks to identify the basic design principles that will allow fertile business ecologies to emerge and evolve optimally through a subtle and dynamic combination of open and closed elements, of centralized and decentralized processes (Morris and Ferguson, 1993).

The *platform leadership* approach to open innovation has three distinctive characteristics. Unlike the more generic and eclectic approach (Chesbrough, 2003; Chesbrough et al., 2006), this approach acknowledges the importance of non-contractual complementors. Also, unlike the former approach, this one is strongly architectural. It predicates the establishment of common platforms as enablers of collective innovation, thus recognizing the generative role of an open platform as a decentralizing device. Thirdly, this approach is very explicit about the importance of a differentiated ecology of firms: not all firms can be platform leaders. Just as there will be a core and a periphery in the system, there will be core players and peripheral players. Because of these characteristics, this approach is well positioned to explain how and why a given sector may evolve through time from a centralized to a decentralized structure, and perhaps back again.

In a previous article, I have argued that a critical determinant of the optimal degree of decentralization for a new platform is the platform leader's capacity to properly identify the platform's opportunity space (Olleros, 2007). If the focal firm is in a position to fully specify the best opportunities for a nascent platform, it can proceed to subcontract all the necessary work to various parties. If, however, the focal firm is nowhere near that position, it will be best to open up the platform to non-contractual innovation and let the inventive power of a diversified periphery drive the platform's evolution.[3]

A corollary to this argument is that the more potentially fertile a new platform is, the more difficult it will be for the focal firm to fully identify its opportunity space and the more the platform can gain from being widely decentralized. This helps to explain why the computer industry has a far more decentralized structure than the automobile or aircraft industries. Despite some early architectural battles, the opportunity spaces of the automobile and the airplane have been a lot more evident to innovators than that of the computer. Thus, the more seminal and fertile an invention is, the more open-ended and decentralized its development should be.

In the present article, I want to extend the argument for decentralization in a different direction. I will argue that decentralization is vital for products and services catering to markets where, typically due to strong network externalities, rapid growth is a matter of survival. This is so because centralized solutions are stymied by a heavy core that hinders rapid scalability and growth.

2.3. The arguments for a lean core

A successful platform leader is primarily a generator of positive externalities. It creates value not so much as a direct and immediate result of offering a set of products and services to final users, but rather by creating a fertile opportunity space for other firms and by establishing an institutional framework within which a loosely connected business ecology can evolve.

In their book, *Platform Leadership*, Gawer and Cusumano (2002) argue that the design of an optimal core by the platform leader is a crucial element of success. They proceed to offer two arguments in favor of a lean core: an argument regarding the platform leader's limited span of competence and another one regarding the platform leader's sustained credibility. The first of these two arguments is not entirely convincing, as a platform leader might well be forced to expand its own set of competences in order to do its job properly.[4]

As for the credibility argument, it basically says that a core firm should not invade its complementors' turf, lest it damage its reputation as a reliable and fair platform leader. This is a stronger argument, but Gawer and Cusumano underplay its importance when they go on to suggest that it is up to complementors to stay away from the platform

[2]For the purposes of this paper, I fully accept the normative framework proposed by the platform leadership literature. For a discussion of the limitations of such a conceptual framework see Olleros (2007).

[3]This argument is a generalization of von Hippel's narrower argument that where platform leaders face expert users with heterogeneous needs, it will pay for the platform leader to push initiative and design freedom toward the final users (von Hippel, 2005).

[4]Consider, for example, Microsoft's recent change of policy with regard to digital music players. Frustrated by the inadequate offering of the various machines attempting to compete against Apple's ipod on the basis of Microsoft's digital music format and software, Microsoft has embarked on the design, manufacturing and marketing of its own ipod-like machine, the Zune (Bass and Armitage, 2006).

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leader's likely path of expansion (Gawer and Cusumano, 2002).

Iansiti and Levien (2004) offer a more elaborate view of open platform dynamics and, in my opinion, a more insightful discussion of the optimal characteristics of a platform's core. They emphasize the crucial fact that at the hub of an innovation network, it greatly pays to share. Like a seminal idea or a communication network, the core of an open platform is not just a shareable (or 'non-rival') good, but even a hyper-shareable (or 'anti-rival') good, one that acquires more value the more it is shared (Benkler, 2004; Weber, 2004). Thus, the best platform leaders—'keystone players', as Iansiti and Levien call them—create value primarily by sharing value. It is in the interest of the platform, and therefore in their own interest, to stay lean and frugal. They know that they can go wrong not only by trying to *capture* too much value, but also by trying to *create* too much value on their own (Iansiti and Levien, 2004).

Iansiti and Levien thus move the argument for a lean core beyond a simple concern about avoiding possible frictions between the platform leader and its complementors. Theirs is an argument in favor of decentralization, rather than simply an argument about staying away from your partner's turf.

Their argument concerns a platform's scalability, as well as its evolvability and resilience. They argue that dominated 'business ecosystems'—that is, those whose leaders create and capture too much value—do not have the requisite diversity needed to respond to major external shocks. Thus, a platform leader should try to maximize the scalability and evolvability of its platform by staying lean and by leveraging to the full extent possible the capabilities of its potential complementors. This it can do by a combination of policies, such as a generous licensing of its intellectual property, a set of simple and stable interfaces accessible to anyone who wants to graft new extensions onto the platform and a useful toolbox for third-party application developers.

Interestingly, the argument that only a lean core can render an open platform scalable and evolvable has been much developed and emphasized by a handful of engineers involved in the early design of the Internet. This argument goes back at least to a 1984 article by J. Saltzer, D. Reed and D. Clark, but it was most explicitly and emphatically made in a 1997 article by David Isenberg, where he explained why a dumb network with smart terminals (the Internet approach) is far better than a smart network with dumb terminals (the telephone network approach). In his words: "A new network philosophy and architecture is replacing the vision of an intelligent network. The vision is one in which the public communications network would be engineered (…) for intelligence at the end-user's device, not in the network" (Isenberg, 1997).

Platform neutrality, a lean platform core and peripheral intelligence and dynamism all go together. Part of the argument has to do with the principle that a lean core enables decentralized control, which in turn enables flexibility and innovation at the edge of the platform. Another, no less important, part of the argument has to do with the fact that only a lean core can scale up rapidly.

The writers behind these ideas, however, seem to think that their arguments only apply to public networks. Isenberg and Weinberger have been particularly emphatic about their belief that the leanest network is the most effective, but also the hardest one to make money running (Isenberg and Weinberger, 2001).

Baldwin and Clark (2006) have argued in favor of a lean platform core—what they call a 'small footprint' approach to competition—as a way to boost ROI and outcompete rivals. Their argument is restricted to for-profit platforms, regards optimal value capture and implicitly assumes that a 'big footprint' approach is feasible, even though perhaps suboptimal. Although similar, my argument regards primarily value creation and is more trenchant than theirs. I argue that for platforms (whether private or public, for-profit or communitarian) catering to very large and dynamic constituencies, a 'big footprint' approach is simply unworkable.

In the next section, I will present some empirical evidence in favor of the lean core argument. I will first analyze two comparative cases of public networks (Internet vs. Minitel and Wikipedia vs. Nupedia), and will then present two other comparative cases (Visa vs. BankAmericard and eBay vs. OnSale) showing that the principle of the lean core can also apply to for-profit, proprietary networks.

3. Four comparative analyses

3.1. Internet vs. Minitel

Few people seem to remember it but, back in the late 1980s and early 1990s, France had, by far, the world's largest network of interactive online services targeted primarily at the residential market—Minitel.[5] In 1991, it provided 20,000 online services—from news and stock quotations to banking and shopping services, electronic bulletin boards and train and airline reservations—to six million subscribers. By comparison, CompuServe reached its highest level of membership ever—some three million members—as late as April 1995. As for America Online (AOL), it was only launched in February 1991.

Minitel's success was all the more remarkable given the fact that several other countries, notably Great Britain with its pioneer Prestel network, had tried similar 'Videotex' ventures without much success.[6]

[5]Though the system's proper name is Télétel, it is better known as Minitel, the name originally given to its user terminals.

[6]Having failed in the home market, Prestel eventually evolved into a successful industrial application: the Sealink network, widely used by British travel agents.

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Minitel's success was not due to the superior quality of the technology it used. The Canadian Videotex alternative, for one, was clearly superior from a technical point of view (Devon, 1991). Rather, the key to Minitel's success was the scale of resources and commitment that the French public authorities engaged in the project. They understood that, due to the inherent network externalities at work, the network would not go anywhere unless they subsidized the early users and enticed many early service providers. They decided to do so in a big way.

For starters, France Télécom—the national public utility heading the project—developed an electronic telephone directory and gave away a free Minitel terminal to everyone who wished to use the electronic directory rather than its paper version. In all, some five million free terminals were distributed within 4 years.[7] From there on, the nascent network developed its own self-sustaining growth dynamic, greatly helped by a second key contribution by France Télécom: a very efficient micro-payment system. Since Minitel used the telephone network and France Télécom had a national monopoly on all telephone services within France, charges to both merchant and clients—as well as payments to the former—were simply added onto, or subtracted from, their monthly phone bills.[8] Given France Telecom's control of data banks, payment flows and telephone connections, payments were virtually guaranteed and the rate of fraudulent services was very low. As an added bonus, Minitel network viruses were unheard of (Marchand, 1987).

France Télécom's strategy was remarkably shrewd and sophisticated for the time. The French public utility was years ahead of most platform leaders in figuring out the way to stimulate both the supply and demand sides of an embryonic two-sided market and, more generally, the critical role of bold commitments as triggers of value-creating, self-sustaining bandwagons (Rohlfs, 2003).

Impressive as it was, however, this French success story had a serious drawback. In essence, while open enough to conquer France, Minitel was not open enough to conquer the world. This manifested itself in two different problems: a standardization problem and a rigidity problem.

As already mentioned, Minitel was not the only interactive Videotex system around. Repeated attempts at developing an international standard for interactive Videotex having led nowhere, Minitel ended up as one of several competing national solutions, each of them sponsored by a local public utility—except in Canada and the US, where most of the initiatives were private. Its success within France could not hide the fact that its technology was rather primitive, nor circumvent the political impossibility of winning over its international rivals in their own territories (Sutherland, 1990; Berne, 1997; Schmidt and Werle, 1998).

In addition, Minitel—like all other Videotex platforms—had a basic architectural flaw: it was very hard to evolve. This was partly due to the decision to use 'dumb' terminals at the edge nodes. Armed with such poor tools, users could hardly play more than a passive role in the network's evolution. Service providers were not in a much better position. For all practical purposes, while accessible and useful at the time, Minitel was a black box to all of them (Nguyen and Phan, 2000). Only France Télécom could tinker with the core, only it could try to evolve the system.

But, as time has shown, even France Télécom could not do much to get Minitel to move beyond its initial capabilities. The problem was not one of lack of imagination. Rather, it was one of inherent rigidities, due to the massive and tightly integrated core at the center of Minitel. Herein lies the basic paradox about Minitel: the centralized control that was so crucial in allowing it to conquer France, handicapped it in its attempt to become a global force and to face the onslaught of Internet. Indeed, the basic problem was not with Minitel or France Télécom, but with the very idea, and basic architecture, of Videotex. This becomes transparent when we consider the reasons of Internet's enormous success.

Somewhat paradoxically, Internet has succeeded in becoming a global network in a very short time partly because it initially set out to do very little: to serve as a dependable interconnection between local networks that could not otherwise communicate with each other. Internet designers started out with no particular plans to create value beyond that.

The Internet is rugged, thanks to packet switching and dynamic routing, but also modular and lean. Whereas Videotex networks bet on tight integration and centralized intelligence, the Internet designers bet instead on modularity and distributed intelligence (Saltzer et al., 1984; Isenberg, 1997). The rapid rate of advance of personal computers—the intelligent nodes at Internet's edge—has proven this design to be right, at the same time that it has made it all the more compelling.[9]

Strictly speaking, Internet is just a small set of standard communication protocols—only that. And this is precisely its strength. The modularity of Internet's core makes it independent of the underlying physical infrastructure, while its leanness pushes intelligence and entrepreneurial initiative to the edges of the network, thus rendering the overall Internet ecology not only rapidly scalable but also highly evolvable. Its core being so modular, lean and accessible, Internet has been able to act as support for a

[7]The large scale of France Télécom's seed investment insured not only the low cost of the terminals, but also the critical mass of users able to attract numerous service suppliers as well as to trigger considerable interaction among users themselves.

[8]Unlike North Americans, French telephone users were accustomed to being charged by France Télécom per unit of time, even for local calls. This fact helped Minitel to get sufficient initial traction.

[9]Some authors have argued, however, that we have now reached the point where a switch to a less distributed architecture would enhance the future stability and sustained growth of the Internet and the World Wide Web (Zittrain, 2006).

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growing number of higher-level platforms—notably the World Wide Web and peer-to-peer networks—that are constantly evolving, adding value and transforming entire industries in unpredictable ways.

By now, Internet is much superior to the Minitel 'walled garden'. It is cheaper, faster, more global, more comprehensive, more user-friendly and more flexible. Above all, it is more inventive and open-ended, seemingly unable to stop surprising us. Internet has become a giant innovation laboratory in ways that Minitel could never be. It is no wonder that the French people are moving there in droves, often via their Minitel terminals.[10]

The contrast between the evolutionary paths of Minitel and Internet can help us to get a better grip on the different degrees and dimensions of systemic openness and on the importance of such differences.

Arpanet, a smart but very primitive network, has been able to evolve into a global and very dynamic mega-platform. Minitel—or any other Videotex platform, for that matter—could not have done so. This is not because Minitel was a closed platform. As we have seen, Minitel was in some ways a wide-open network. France Telecom not only allowed any service provider to enter the network; it also facilitated such entry by the establishment of a very efficient payment platform open to all (Brousseau et al., 1996).

Minitel, however, has fallen short of Internet's radical openness in at least four ways:

(1) Minitel is a for-profit, proprietary platform.
(2) Minitel does not conform to the digital communication protocols that have become de-facto standards all over the world.
(3) Minitel is highly centralized. France Télécom acts as the inescapable intermediary between all network users for all connections and transactions.
(4) As a result of the previous drawback, Minitel has a hefty, tightly integrated core.

In this paper, we are particularly interested in this last drawback, which has greatly limited the scalability and evolvability of Minitel. In the next three comparative cases, we will see that the principle of the lean core, so dear to Internet designers, is applicable to application services as well. In all three cases, the success of a lean core architecture followed the disappearance or stagnation of similar efforts that had been built around a heavy core.

3.2. Wikipedia vs. Nupedia

Few markets have been as thoroughly and rapidly transformed by digital technologies as the market for general-purpose encyclopedias. Up until the mid-1990s, the encyclopedia was a cultural icon, an expensive and bulky repository of trustworthy information that could hold a prominent place in the most elegant boardroom or living room. The CD-ROM changed all that. Suddenly, the encyclopedia was a tiny disc, very affordable (when not bundled for free with a new personal computer), rich in multimedia and offering seamless navigation through hyperlinked cross-references. Though it had become a far more useful tool, it could no longer command the high prices and generous margins of yesteryear.

The erosion of profit margins had a lot to do with the entry of Microsoft's Encarta into the fray. Microsoft commoditized encyclopedias by targeting a massive market of price-conscious users and by giving away millions of free copies of an encyclopedia with a barely adequate text. The result was not just a huge migration of value from suppliers to users, but also a net destruction of value, as the encyclopedia lost its iconic status and its place in the boardroom or living room bookcase. In the process, and most importantly, the old emphasis on seeking a reputed author for every encyclopedia entry started to erode, at the same time that the critical expertise for publishers shifted from content to software integration. The impact of this rapid transformation on Encyclopedia Britannica and other general-purpose encyclopedias is widely seen as an archetype of the digital disruption at work[11] (Evans and Wurster, 1997; Stross, 1996).

Incumbent encyclopedias had not yet recovered from the CD-ROM disruption when the Internet emerged to threaten their business models even more radically. As far as encyclopedias are concerned, the leading edge of the Internet onslaught is Wikipedia, a free, web-based collaborative project that seems bound to bury commercial general-purpose encyclopedias for good.

Started in January 2001 by Jimmy Wales and Larry Sanger, as of July 4, 2007, there were 252 language editions of Wikipedia; of these, the top 14 had over 100,000 articles and the top 136 had over 1000 articles. The English-language Wikipedia alone contained 1,864,080 articles. Over 1600 new articles are added each day across all the various languages. As of July 4, 2007, Wikipedia had 4,784,630 registered users, of which 1265 (or 0.03%) were administrators. As of this date, users, registered or not, had made 147,781,050 edits, with an average of 15.66 per page, since July 2002. According to website rankings at Alexa.com, by 2004 Wikipedia was already attracting seven times more users than Britannica.com. Since January 2006 Britannica's average daily page views score has been less than 1% of Wikipedia's.[12]

Wikipedia has no centralized system for quality control. Virtually anyone can contribute new entries or edit existing

[10]At best, the Minitel terminals will survive as cheap 'Internet appliances'. But the days of the Télétel network connecting those terminals are counted (Solymar, 1999).

[11]Britannica's troubles, in particular, raise a puzzling paradox. The 'information economy' does not seem to have a place for this 'Rolls-Royce' of information.

[12]For these and other interesting facts about Wikipedia, see: ⟨http://en.wikipedia.org/wiki/Special:Statistics⟩.

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ones.[13] A relatively small cadre of administrators can intervene in cases of recurrent vandalism or persistent prejudice by banishing uncooperative contributors or, in extreme cases, blocking particular pages so that no one can modify them for an indefinite period of time. But such administrators are unpaid volunteers who have risen, by proven merit, from the ranks of registered users.

While articles need not be perfect—they are never finished, after all—they should try to be neutral and fair. Articles addressing controversial topics, in particular, must strive to present a balanced view of all sides of the debate. Crucially, however, administrators need not concern themselves with correcting biases. The Wikipedia community's commitment to neutrality is strong and widespread enough to insure that, in most cases, ordinary users will look after correcting each other's biases and errors.

Wikipedia's current success and future prospects raise many interesting questions.[14] For the purposes of our present argument, however, the most interesting aspect about the Wikipedia story is one that is sometimes ignored or glossed over, namely, the fact that Wales and Sanger's first attempt to launch a web-based collaborative encyclopedia was a sobering failure.

One year prior to launching Wikipedia, Wales and Sanger had launched Nupedia, a free, collaborative encyclopedia very much like Wikipedia, but with a strict and demanding editorial policy: every article had to be authored by a recognized expert in the pertinent field and had to survive a rigorous seven-step peer-review process. A year and several thousand dollars later, Nupedia contained only 24 finished articles.[15]

Right about the time that the impracticality of the Nupedia formula was becoming evident, Wales and Sanger came across Ward Cunningham's Wiki software. Wikis offered three crucial advantages:

(1) Zero barriers to good-willed contributions. In principle, anyone can start an article or edit an existing article.
(2) The ability to track the status of articles, review individual changes, and discuss issues.
(3) A trivial mechanism for erasing ill-willed modifications—with a simple click, a vandalized page can be restored to its state before the attack.[16]

Together, these three elements tip the balance in favor of productive and cooperative members of the Wiki community, allowing quality content to emerge (Lih, 2004).

Initially, Wales and Sanger saw Wikipedia as a project complementary to Nupedia.[17] In March 2003, however, in view of Wikipedia's explosive growth and Nupedia's persistent crawl, the latter project was discontinued.

It is, I think, worthwhile dwelling on the various aspects of Nupedia's faulty design. As already mentioned, like Wikipedia and unlike Britannica, Nupedia intended to be a public good developed by a team of unremunerated volunteers.[18] But like Britannica and unlike Wikipedia, Nupedia wanted to maintain the one-recognized-expert-per-article policy and the stringent review and editing process.

The drawbacks of this formula were primarily two. First, by limiting the pool of potential contributors to recognized experts, Nupedia not only deprived itself of the resources of thousands of unrecognized experts—many of whom often have more passion for their pet subjects, and more free time, than highly reputed people—but also failed to capitalize on the useful efforts of an even larger number of amateurs. Given the transparency and flexibility of the Wiki formula, a preliminary 'stub' produced by an amateur can act as a powerful incentive for more expert people to correct and complete what is already posted. Secondly, and more importantly, by burdening the editorial team with the task of screening aspiring contributors and monitoring the review and evaluation of their work by their peers, Nupedia's designers radically undermined their project's scalability and rendered it totally impractical.

Nupedia's designers clearly underestimated the wealth of resources they could tap by opening the door to unrecognized experts and mere amateurs. But they also underestimated the transaction costs that their formula would impose on the platform's core constituency.

It is worth emphasizing that the second of these two mistakes was the more serious one. In fact, Larry Sanger, who was always uneasy about the anarchic elements in Wikipedia and left that project in January 2003, has recently argued that Nupedia's experts-only policy was not a mistake. According to him, if Nupedia had evolved into an expert-only encyclopedia without centralized editorial supervision, it might have survived and become even more useful than Wikipedia is today (Sanger, 2006).[19]

[13]For the first 5 years, there were no restrictions on potential contributors. Recently, things have tightened up a bit. Logged-in, registered users can start a new page or edit existing pages. Unregistered or unlogged users can edit any existing page, but they cannot start a new page without first getting it approved by a registered user (see: 〈http://en.wikipedia.org/wiki/Help:Starting_a_new_page〉).

[14]Legitimate questions range from the conceptual (is it really an encyclopedia?) to the pragmatic (can it be used as a reliable source of information in journalistic, academic or legal work?).

[15]On the history of Nupedia, see Sanger (2006) and 〈http://en.wikipedia.org/wiki/Nupedia〉.

[16]As the Wikipedia entry on Wikis explains: "Wikis generally are designed with the philosophy of making it easy to correct mistakes, rather than making it difficult to make them" (Wikipedia, 2006). This has proven to be a very smart choice. Barriers to all contributors can be set low precisely because the cost of fixing any damage is trivial. Most vandalism to Wikipedia is fixed in five minutes or less, due to the large community that watches over the *Recently Changed* page list.

[17]Larry Sanger, for one, thought that Nupedia's problems would be solved by a combination of a simpler review process and a symbiotic relationship with Wikipedia—the latter acting as a feeder of promising articles for the former.

[18]Strictly speaking, Nupedia was, and Wikipedia remains, a private platform. But, for all practical purposes, they were turned over by its owner—a non-profit foundation—onto the public domain.

[19]Sanger has decided to act on this conviction and recently launched *Citizendium*, a new online collaborative encyclopedia moderated by recognized experts and shut to anonymous contributions. Only time will

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3.3. Visa vs. BankAmericard

In a recent book, Dee Hock, founder and CEO emeritus of Visa, tells the story of how, in the late 1960s and early 1970s, he orchestrated the launch of the first and most successful inter-bank credit card cooperative in the world (Hock, 2005).

Unlike Diners' Club or American Express, and like MasterCard, Visa is a cooperative effort open to any financial institution that wants to join in. But, as Hock explains in his book, Visa's open sponsorship was only one element of Visa's success. Two other architectural choices proved to be just as critical.

Prior to Visa, several large banks—Hock's employer, the Bank of America, among them—had each tried to launch their own 'open sponsorship' cards, without any success. It was a classic case of an infant industry deadlock. On the one hand, no bank was thrilled by the idea of supporting a card franchised by a competitor, if it could have its own. On the other hand, the launching of so many competing cards only exacerbated the considerable uncertainty already faced by potential card-holders and merchants, thus undermining the chances of any one card attracting a critical mass of adopters. All the cards seemed, at best, destined to fight each other for a crowded niche—the high end of the market, already occupied by Diners' and American Express.

Hock had a totally different vision. He saw a universal credit card becoming the instrument of choice for all manners of payments, by millions of people, across the world. He realized that the solution was to create a wide-open, inter-bank coalition where no particular bank would hold a privileged position. He thus moved Visa from under the wings of Bank of America, where it had started as *BankAmericard*, and structured it as a not-for-profit inter-bank cooperative that provides services to its members, in exchange for membership fees. This solved the coordination and legitimacy problems and cut through the collective deadlock of competing solutions.

Secondly, Hock also realized that to stand a chance of becoming a worldwide solution, Visa needed to be easily scalable, which meant that the core of the Visa network had to be very lean. Visa, he decided, would not get involved in issuing cards or loans; it would only establish the standards, technology infrastructure and marketing programs necessary to launch the card and insure its success. Today, Visa's central activities are conducted by a staff of about 1300 employees, less than 0.5% of the total number of people involved in issuing Visa cards (Evans and Schmalensee, 2005). Around this lean core gravitates, a worldwide business ecosystem that includes 21,000 issuing institutions and 20 million merchants and allows more than a billion card-holders to purchase $3.2 trillion of goods and services in more than 150 countries (Hock, 2005).[20]

Clearly, ascribing Visa's success and dominant position to its open sponsorship regime would be far too simplistic. Such an explanation would overlook the critical role played by the neutrality and leanness of the platform's core.[21]

3.4. eBay vs. OnSale

Founded by Pierre Omidyar in September 1995, eBay rates as one of the most remarkable successes of the Internet economy. Profitable from the outset, by the end of 2005 the online auction service had more than 180 million registered users around the world, yearly revenues of $4.5 billion and an operating profit margin of 35%.[22]

eBay is a prime exhibit of the Internet's capacity to create new businesses and markets. Millions of trades that would have been impossible only a few years ago are routinely executed today through eBay (Kambil and van Heck, 2002). Tens of thousands of new businesses have been set up simply to sell on eBay (Clark, 2004).

Everything is for sale at eBay: jewelry, automobiles, photographic equipments, furniture, computers, airplanes and more. The sheer scale of its operations is astounding. eBay serves some 1.7 billion page views per day. Several million items are added to the site every day. At any given time, over 25 million items are listed for sale (Iverson, 2004). eBay generated roughly $12 billion in gross merchandise sales in the last quarter of 2005.

eBay is today well ahead of all other online auction rivals. Not even large players such as Amazon and Yahoo can begin to threaten eBay's dominance of the worldwide online auction space, a dominance that seems to grow by the day.

What is so special about eBay? What could explain such a sterling success? Not intellectual property. Although eBay must have a considerable stack of patents to its credit, none of them have been critical to its success. In essence, eBay's growing success is primarily due to the phenomenal speed at which it seized market space in the first few years of its existence. In a market with strong network externalities, such as this one, increasing returns to network scale give an irreversible advantage to the first fast-moving firm[23] (Shapiro and Varian, 1998). Quite

(*footnote continued*)
tell whether this hybrid project, part Wikipedia and part Nupedia, will be a success.

[20]With time, by moving considerable amounts of data and processing power to the edge of the network, smart cards will allow for an even leaner network core.

[21]The same can be said about MasterCard, the competing inter-bank cooperative that has followed Visa's trail throughout the years.

[22]〈http://investor.ebay.com/downloads/fund_IncomeStatements.pdf〉 and 〈http://investor.ebay.com/downloads/fund_Metrics.pdf〉.

[23]In markets with strong network externalities, the old adage that nothing succeeds like success is a fact of life. In Adam Cohen's words: "For online networks like eBay, where the user experience is almost completely determined by the other users of the site, being the first to build a large network gives a site a critical edge. It was the difference, as a PC Magazine reviewer observed, between being able to offer 2500 cameras and 8" (Cohen, 2002, p. 101).

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simply, the greater the number of registered users buying and putting up things for sale at eBay, the more valuable the eBay network became for new participants on both sides of the market. As we shall see, eBay was not the pioneer of the online auction market, but it was the first to scale up, that is, the first to operate efficiently on a massive volume of transactions.

And why was eBay the first fast mover, able to capture so much market space so fast? Several operational innovations, such as its rating system to build up traders' reputations and its infrastructure for payments and settlements, certainly helped. But one basic design choice, in particular, made a world of difference: the decision to build the eBay platform around a very lean core. From the beginning, Pierre Omidyar decided that eBay would never be a trader, only a facilitator of trades.

eBay's is essentially a toll-taking business model. It has created a very efficient trading infrastructure and it charges a toll to those who use it—actually, only sellers pay. The company simply brings sellers and buyers together and facilitates their exchanges. It does nothing else. eBay holds no inventory and does not have to handle any trade logistics or decide how it will represent the product and advertise it. Customers do it all, saving eBay the costs of purchasing, warehousing, shipping, collecting buyers' payments, etc.

Several important consequences flow from this. First, not being a trader or an agent for traders, eBay has no particular interest in the goods sold at auction. This eliminates any possible source of conflict of interests and allows eBay to play the role of a fair, neutral broker that all buyers and sellers can trust. Second, eBay has no responsibility for the goods offered at auction. This eliminates any possibility of legal hassles.[24] Third, its relatively low fixed costs allowed eBay to be profitable from day one. Finally, and most pertinent to our argument, eBay's low variable costs allowed it to ramp up rapidly its business model, with a minimum investment in manpower, physical plant and equipment.

Pierre Omidyar is the first one to admit that the decision to stay away from trading was born of necessity rather than extraordinary genius. It was forced upon him by the meagerness of his initial resources (Cohen, 2002). Interestingly, OnSale, eBay's main competitor at the time—and the true pioneer of the online auction market—was much better financed. It could afford to get involved in trading. It did precisely that, and … it lost the auction market to eBay. The story is worth telling in some detail.

eBay did not invent online auctions. Before eBay, there was *OnSale*, a company that had been auctioning off excess computer parts before Omidyar created AuctionWeb, the precursor of eBay.[25] OnSale started out as *Online*, the brainchild of Web entrepreneurs Jerry Kaplan and Alan Fisher. Initially, it sold a selection of excess, closeout and refurbished consumer electronics products. Later on, Online expanded its line to include sporting goods and vacations. It offered these through *OnSale at Auction* (Bunnell, 2000).

By 1997, with 400,000 registered users, OnSale was the leader in online auctions, and as a publicly traded company, it had access to the money markets and hence to the media. 1997 sales exceeded $80 million and a September 12 deal with America Online Inc. gave the auctioneer instant access to AOL's 12 million members by featuring OnSale on AOL's shopping channel (Moran, 1997).

OnSale, however chose to be a merchant site, which took possession of goods and auctioned them off itself. This decision greatly limited their capacity to grow, for all the reasons mentioned above.

In early 1998, OnSale began to supplement its merchant site with an auction listing service similar to that of eBay, aimed at the person-to-person market (Lucking-Reiley, 2000). But it failed to match eBay's growth. In addition to making the blunder of starting off with a spam campaign targeted at eBay clients, OnSale lacked focus and single-mindedness. The person-to-person market was a sideline to them. OnSale also failed to convince users that it was the sort of fair, neutral broker eBay had always been. Adam Cohen explains well the problem: "In Omidyar's model, eBay was no more than a middleman. It had no reason to favor buyers or sellers; its only economic interest was encouraging listings and completed transactions. OnSale, which was itself a seller on the merchant part of its site, seemed to be more interested in high prices for sellers than bargains for buyers".

Eventually, network effects and switching costs kicked in and started to pull the person-to-person auction market toward a winner-take-all outcome. By then, eBay was well positioned to take advantage of the self-reinforcing success dynamic. OnSale and all other rivals were left behind.

Today, OnSale is no longer in the auction business, having sold its incipient person-to-person service to Yahoo (Lucking-Reiley, 2000). The company has become an online discount wholesaler of consumer electronics and computer equipment. It is profitable, but it is nowhere near eBay's league.

eBay, meanwhile, is in the midst of a massive change fuelled by the new generation of Web service software technologies. Ever focused on improving the trading experience, it is presently moving from being a facilitator of transactions to being a facilitator of trade facilitators. Having learned to leverage users' time and resources to contribute to its platform, eBay is now giving a new twist to its formula by mastering the art of leveraging the resources and inventiveness of independent software developers to improve the performance of its platform. In the process, the platform is shifting to a higher level of decentralization.[26]

[24]In January 2001, eBay won an important legal case. A San Diego state court judge dismissed a $100 million class-action lawsuit filed on behalf of buyers of fake sports memorabilia (Cohen, 2002, p. 308).

[25]*Onsale*'s first auction took place in May 1995 (Bunnell, 2000, p. 79).

[26]As of June 2005, there were over 15,000 members in the *eBay Developers Program*, comprising a broad range of companies creating

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4. Conclusions

This paper has illustrated and made more explicit the argument for decentralization offered by the platform leadership literature. Our study has shown that a simple open vs. closed platform dichotomy is not useful in understanding the limitations of Minitel, Nupedia, BankAmericard and OnSale. These platforms were unable to match the dynamism and growth of Internet, Wikipedia, Visa and eBay, respectively, not because of an excessive systemic closure but because of a centralized governance regime. Unlike the former set of platforms, where the platform leader managed a great deal of activity, transactions and value, the latter platforms were all designed around a very lean core that pushed costs, risks, intelligence and initiative toward the periphery. This allowed them to scale up and evolve very rapidly and effectively.

In addition, and against the view stated by some Internet designers and analysts, we have shown that the principle of the lean platform core can also apply to for-profit, proprietary platforms. The enormous success of Visa and eBay attest to the fact that a lean core can be crucial to the rapid expansion and dominance of a proprietary platform.

In summary, then, this paper offers three research hypotheses for further exploration. First, the decentralization of an open platform may be critical to its success. Thus, important as the open vs. closed platform distinction can be, the distinction between centralized and decentralized open platforms is at least equally important. Second, decentralization becomes inescapable for platforms that have to scale up rapidly to cater to a large, heterogeneous and dynamic constituency. Third, decentralizing an open platform requires a lean core. A platform leader hoping to build a platform (whether private or public) for the masses, must resist the temptation to create too much value on its own, lest it undermine the platform's legitimacy, scalability and evolvability.

Our argument has some evident limitations. The lean platform core principle is not universal. Even today, some very effective platforms are fairly closed—witness the success of Apple's ipod or eBay's Skype. Moreover, even if open, some platforms may need to be built around a substantial, and substantially centralized, core—think of NTT DoCoMo's i-mode system for wireless Internet.

The optimal platform core is the leanest core capable of eliciting from an innovative market or community all the missing elements to bring the platform to its highest degree of functionality. At times, and to some degree, platform fertility and leanness may not go well together. That is, a platform core may have to be quite substantial in order to become truly fertile. Further research should try to elucidate the boundaries of application of the lean core principle.

(*footnote continued*)
software applications to support eBay buyers and sellers as well as eBay Affiliates. Already in 2004, eBay generated nearly 40% of its listings through its eBay developer program (Clark, 2004; Iverson, 2004).

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