

MULTI-SIDED PLATFORMS: FROM MICROFOUNDATIONS TO DESIGN AND EXPANSION STRATEGIES

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Abstract

Multi-sided platforms (MSPs), which bring together two or more interdependent groups of customers, have recently risen to economic and business prominence in many industries. This paper first lays out a simple micro-founded framework which aims to organize academic and managerial thinking about MSPs. It argues that any MSP performs one or both among two fundamental functions: reducing *search costs* and reducing *shared transaction costs* among its multiple sides. Using a variety of illustrations, the framework is then used to formulate general principles driving MSP design and expansion strategies: choosing the relevant platform “sides”, deciding which fundamental activities to perform and trading off *depth* against *scope* of MSP functions.

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1. Introduction

The term “platform” has become increasingly popular with executives today: many companies claim to be “a” or “the” platform in their respective industries. This generally comes from the realization that platforms, and in particular multi-sided platforms (MSPs) – those that serve the needs of interdependent constituents: eBay for buyers and sellers; Microsoft Windows for application developers, PC makers and PC users; shopping malls for retail shops and shoppers; digital media services for content owners and users, etc. – occupy privileged positions in their respective industries. Examples include Microsoft, eBay, Rakuten, Google, etc.

MSPs have existed for centuries - for instance of the village market and matchmakers. However, their prominence has soared only recently, mostly because of information technology, which has tremendously increased the opportunities for building larger, more valuable and powerful platforms. At the same time, by expanding the potential scope of platforms, technology has also increased the number and complexity of the factors – economic and technical– that drive the strategic design of MSPs. Deciding who are the relevant groups of customers for the MSP and the fundamental services the platform needs to perform for those customers are critical to an MSP’s success, even before it is launched and priced. Yet, although many companies play up the platform card, surprisingly few rigorously analyze the underlying drivers of their MSPs, instead relying on vague statements about “platforms” and “network effects” in order to capture the attention (and imagination) of would-be investors. The emerging business and economics literature on two-sided markets up to now has not been of much help in this direction either, as it has mostly focused on pricing and competition between platforms², taking their existence as given and without tackling broader strategic questions regarding design, vertical and horizontal scope of MSPs.

This article starts by providing a general framework designed to help organize managerial thinking about MSPs. Given the diversity of industries in which they operate and the variety of forms MSPs can take, it is useful to be aware of their common denominator –

² Rochet and Tirole (2003) and (2004); Armstrong (2006); Caillaud and Jullien (2003); Evans (2003); Hagiu (2006a) and (2006b).

the fundamental functions they perform. In particular, we argue that no matter the industry, any MSP serves one or several among three fundamental purposes. We then apply this micro-founded framework to formulate general principles driving MSP design and expansion strategies. What are the relevant platform “sides” (or constituents)? Which activities should the platform perform for those constituents and which should be foregone? How should an MSP trade off depth vs. scope in its functions?

2. A micro-founded framework for analyzing MSPs

The first step in designing a MSP is to understand what MSPs do.

An MSP provides a support that facilitates interactions (or transactions) among the two or more constituents (sides) that it serves, such that members of one side are more likely to get on board the MSP when more members of another side do so.

In other words, there are *positive indirect network effects* among the various customer groups that an MSP brings together. Note that the notion of customer groups is very different from the notion of customer segments. The relevant customer groups (or sides) for the Xbox videogame console are the end users and the independent game developers. But within the user side one can distinguish between, say, the teenager segment and the young adult segment (22-29 years old). Xbox has greater value for any user of any of these two segments the more games are developed for the console (and viceversa, it is a more attractive platform for independent game developers if it has a larger installed base of users). There might also exist direct network effects, whereby Xbox users may care about how many other users – usually within the same customer segment – have an Xbox.

It is however the requirement of exhibiting indirect network effects that is absolutely essential in order to have a true MSP and not a single-sided platform (which usually exhibits economies of scale), a distinction managers oftentimes gloss over. To illustrate the difference, consider Amazon, a platform connecting merchants of increasingly varied kinds of products to consumers. The more merchants Amazon draws to one of its numerous affiliation programs (zShops, Merchants@Amazon.com, Merchants.com) the more comprehensive and appealing its e-commerce website becomes from the point of view of consumers; and

viceversa, increased user traffic to Amazon's portal makes affiliation more valuable for any individual merchant³. This part of Amazon's business is therefore clearly two-sided. However, in October 2006, the company announced three new product offerings: Elastic Compute Cloud, which lets programmers rent computing capacity on Amazon's systems; Simple Storage Service (S3), which provides cheap access to online storage; and Mechanical Turk, which connects firms with people who perform small tasks that are difficult to automate. For anyone still thinking of Amazon as an online retailer, Jeff Bezos explained that this is the wrong way to think about his company. Instead, he argued, Amazon is a platform which, in its quest to make it easier for merchants of an increasing number of types to reach consumers, has made large investments (reportedly over \$2 billion) to develop valuable capabilities for its own purposes, which it can now leverage to reduce costs for all firms that could use a portion of this huge technology infrastructure. This is a clear example of economies of scale at work.

However, do Amazon's new products exhibit indirect network effects? Not unless the firms taking advantage of them will offer their own products through Amazon's website, thereby connecting with its customer side. In other words, if the users of E3, Elastic Compute Cloud and Mechanical Turk are or become Amazon-affiliated merchants, then the answer is yes; otherwise they will not contribute to increasing Amazon's user traffic. Obviously, the Holy Grail is to have both economies of scale and indirect network effects, which is why Amazon is working hard to make its new infrastructure services as appealing as possible to its merchants.

The Amazon example shows that even the value of the most innovative one-sided platforms can be substantially enhanced if they are leveraged into MSPs and therefore generate indirect network effects in addition to economies of scale. This is achieved by strategically designing platforms to appeal to multiple sides. And strategic design hinges crucially on the choice of platform functionalities.

³ See Leschly et al. (2003).

At the most fundamental level there are two types of basic functions that MSPs can perform: reducing search costs, incurred by the MSP's multiple constituents before transacting, and reducing shared costs, incurred during the transactions themselves. Any feature or functionality of an MSP falls into either of these two fundamental types.

Reducing search costs

Search costs are costs incurred by the multiple sides *before* they actually interact, in order to determine the best “trading partners”. These can be further divided into two types, according to whether each of the two (or multiple) sides is searching for each other or only one is.

In two-sided matchmaking contexts, both sides are searching for each other: men and women on www.match.com, buyers and sellers on eBay. By contrast, platforms that reduce one-sided search costs are making audiences for the searching side while providing a standalone service to the non-searching side (the audience). This is essentially the case with advertising platforms, which allow advertisers to reach an audience of consumers. For example, viewers watch TV for content and the resulting audience is sold to advertisers. Similarly, people go to Google to search websites and advertisers pay for the privilege of having their sponsored links appear on the top right hand side of the results pages for correlated searches.

Reducing search costs in a two-sided matchmaking setting generally means reducing two-sided asymmetric information, which makes “sampling” of candidates for “transactions” easier. Here the network effects go in both directions: the more men affiliate with match.com – which requires them to provide some basic personal information in order to be able to search the database -, the more valuable affiliation with the site becomes for women, since they can search a larger database of men. And it also works the other way around. Note that network effects could vanish if match.com allowed people to search without registering: when a man (woman) searches the site without registering, other women (men) do not get any benefit from his (her) presence.

MSPs generally go beyond simple aggregation of databases (or portals in the case of content) when they wish to make sampling and search easier. Many reduce asymmetric information further by engaging in “quality certification” of at least one side, a process which

can take various forms. One of the most restrictive is that adopted by videogame consoles, which maintain a very tight control over what games get published. NTT DoCoMo, Japan's leading mobile operator, has chosen a softer form for i-mode, its mobile Internet service: it endorses only a fraction of the content providers for i-mode, labeling them official; the rest is not excluded, but are known to be unofficial content. An even softer certification is that created by eBay, which allows buyers to rate sellers as opposed to certifying them itself. Finally, some MPSs such as Microsoft's Windows dispense with certification altogether, presumably because they believe asymmetric information is not an issue in their markets.

Audience-making MSPs generally reduce search costs by making it easier for the searching side to provide information about new products or services to the audience on the other side. The key difference with the two-sided matchmakers is that here indirect network effects mostly flow in one direction only: advertisers care about the audience's size *and* homogeneity along certain characteristics they can use (both of which increase the targeting effectiveness of the advertising medium), but the value the audience derives from the MSP typically does not depend on the number of advertisers in the best case and may even decrease in that number (negative externality of advertising) in some cases.

The distinction between these two types of search cost reductions is important because the implications for design are different. When only side A values reaching side B (and side B is indifferent to side A's presence), the platform provider needs to be extra careful when adding functionalities which make this process easier for side A, so as not to compromise the service or product offered to side B. As an example, Google made a conscious decision not to allow pictures or videos in the sponsored ad space, precisely in order not to degrade the consumer search experience, for which relevance is key.

Reducing shared costs

The second fundamental function is to reduce the costs incurred during the transactions themselves, i.e. *after* search is over and the transacting parties have found each other. A portion of these costs is generally common to all transactions between different members of the relevant sides of the MSP, which is why we call them "shared" or "duplicate" costs.

Payment systems are classic examples of shared cost-reducing MSPs: they provide an infrastructure which significantly eases transactions between buyers and sellers by eliminating the need for barter. Aside from traditional credit cards, more recent examples of payment systems include eBay’s PayPal. The indirect network effects are clearly two-sided here: the more sellers (merchants) accept PayPal (Visa credit cards) payments, the more valuable opening a PayPal account (having a Visa card) is for eBay users (consumers); and conversely, the value of having a PayPal account (installing a Visa card reader) for a seller (merchant) is directly proportional to the fraction of eBay buyers (consumers) who have PayPal accounts (carry Visa cards). Videogame consoles and software operating systems are other important examples of MSPs that slash shared costs for third-party game and application developers on one side, and users of games or PC applications on the other. It would be terribly inefficient if developers had to build a console for each game. If this thought experiment seems far-fetched today, it is useful to remember that up until the end of the 1970s, each videogame was hardwired into a game machine (portable or not). This only changed when Fairchild and Atari introduced the first multi-game machines in 1976 and 1979 respectively. Since then, the role of consoles has always been to take care of the base level functionalities which are needed by all (or most) games – 3D graphics and sound rendering capabilities, translation of high-level programming code into console-readable instructions, etc. The same holds true for PC operating systems with respect to software applications.

The table below lists the fundamental functions performed by a variety of MSPs⁴:

Platform	Primary fundamental function(s)⁵	Secondary fundamental functions
Credit cards, PayPal, Suica, Edy	3	Some 1 (creditworthiness)
Videogame consoles	3	1 (certification of 3 rd party developers)
Software platforms: Mac OS, Windows, Palm OS, Symbian, SAP NetWeaver	3	

⁴ Some of the MSPs mentioned in the table are described later in the article.

⁵ 1: reducing two-sided search costs; 2: making audiences; 3: reducing shared costs.

Shopping malls	3	Some 1, some 2
Ticketmaster	3	Some 1
Dating clubs	1	Some 3 (“infrastructure” for dating: bar, café, etc.)
eBay, Alibaba.com ⁶ and other on-line matchmakers	1, 3	2 if ad-supported
Financial exchanges	1, 3	
Yellow Pages, ad-supported newspapers, magazines, TV	2	
Amazon.com	3, 1	
NTT DoCoMo’s i-mode	3	1 (portal), quality certification

The immediate benefit of this general framework is to provide a simple and unified way of thinking about all MSPs, regardless of the industry(ies) in which they operate. However, the most useful practical application comes from using it systematically to analyze how the individual strategic and operational activities a company is (or should be) performing map into the fundamental MSP functions. It can help uncover valuable expansion opportunities and difficult tradeoffs that need to be made when designing MSPs.

3. From one-sided businesses to MSPs

There are many products or services which are one-sided, i.e cater to only one customer group, but which hold the potential to be expanded into an MSP by offering to reduce the costs associated with transactions between their existing customers and new customer groups. The trick is of course to spot such new customer groups that can be linked profitably to your platform.

A case in point is Lawson, Japan’s second-largest convenience store chain, which was a one-sided business until 2000, when it decided to start leveraging its dense network of stores to partner with other companies that could benefit from offering their services through Lawson. The most prominent partnerships were with utility companies such as Tepco (electricity) and Tokyo Gas and with Yamato, Japan’s leading C2C parcel-delivery service

⁶ Leading B2B and B2C Internet commerce platform in China, similar to eBay. eBay is a distant second in the Chinese market with 36% market share, while Alibaba has 59%.

company. These deals created tremendous shared cost savings by allowing consumers to pay their electricity, gas and water bills, as well as to send and pick-up their parcels from the Lawson convenience store (open 24/7) in front of their home (in exchange, Lawson charged a small fee to the companies on behalf of which it performed the service). One of the star features of the Yamato deal was a ski delivery service: residents of Tokyo (and other metropolitan areas) could drop the skis at their favorite Lawson in Tokyo, take the train or drive to the ski resort and retrieve the skis from a local Lawson (and do the reverse process for the return leg of the trip)⁷.

In this way, Lawson was able to generate significant two-sided indirect network effects: the more services Lawson offers, the more reasons consumers have to visit its stores and the more consumers visit its stores, the more attractive Lawson becomes as a partner or platform for third party service providers.

Another example of a company creatively transforming its single-sided business into an MSP is Japan Railways East (JR East), the largest train operator in the Tokyo area, which carries more than 10 million passengers daily. In November of 2001, JR East started embedding a contact-less technology created by Sony and called FeliCa into its transit fare cards: it allowed commuters to zip through train station turnstiles with a simple wave of their card. The new commuter card, dubbed Suica (Super Urban Intelligent Card), was a hit: 6.5 million commuters were carrying it as of June 2003. Then, starting in the spring of 2004, JR East leveraged its success with train passengers to convince physical merchants (convenience stores, cafes, restaurants) located within or in close proximity to JR stations to install contact-less readers enabling Suica holders to use it as a prepaid payment system⁸ when shopping there. Today there are over 15 million Suica users and 2,500 merchants accepting it.

The reason expansion from a well-established one-sided firm can be a particularly powerful way of becoming a TSP (and eventually an MSP) is that this process avoids facing head-on the chicken-and-egg problem inherent to launching MSPs. Anyone having tried to introduce a new payment system knows it is exceedingly difficult to get both merchants and consumers to adopt it at the same time: one side will not come without the other. A business

⁷ In October 2004, Lawson entered a similar deal with Japan Post, thereby ending the exclusive relationship with Yamato.

⁸ The card can be refilled with cash in JR stations or using a credit card online.

having a strong existing relationship with either side (merchants or consumers), which can be leveraged, is in a much better position to achieve that.

The key of course is to find the most powerful leverage for one's established one-sided strength, i.e. identify a new side (or new sides) that could create(s) strong indirect network effects with the existing one. A simple two-step way to achieve this is by: 1) *identifying the fundamental function a business performs for its customers*⁹; 2) *identifying other customer groups with whom the existing customers conduct frequent transactions, for which the existing business can enhance the value or lower the cost.*

Technology in particular has greatly expanded the range of creative levers that one-sided businesses can come up with in order to expand into unexpected directions, oftentimes with disruptive effects. Google is credited with pioneering the now established Internet business model of associating sponsored links to search results. Indeed, Google itself started as a one-sided search service but quickly realized that the technology which it used to enable consumers to search the web could also be used to reduce search costs between advertisers and consumers, hence the creation of AdWord and AdSense, the programs which allow it to offer and charge for search-related advertising. This invention was a quantum leap in advertising efficiency, which many think has put advertising through traditional media on a glide path to extinction. A car dealer advertising in the Yellow Pages pays for his ad being put in the directories that go to *all* consumers, including those who have no interest in cars whatsoever. By contrast, by placing a sponsored link with Google, the dealer only pays only when users click on his sponsored link, which implicitly means they have a much higher probability of being interested in purchasing a car.

The preceding arguments suggest that managers should revisit their way of thinking about when it makes sense for a company to cross industry boundaries. Conventional wisdom holds that it is generally good to focus on one industry or one tightly-knit set of activities. After all, it is this practice that has traditionally created well-defined industries, each with its own star (General Motors, Toyota, Standard Oil, Procter & Gamble, IBM in the early era of computing, etc.). Sure, companies like General Electric have challenged these precepts by

⁹ For example: in the case of Lawson and JR East's Suica, the fundamental function is ubiquitous convenience; in the case of Google, it is audience-segmentation by interests.

showing that one can create important synergies across several industrial sectors through production-side economies of scale and learning effects. But the economic value - as well as the disruptions - created by industry convergence and driven by MSPs are at least an order of magnitude larger than what conglomerates operating one-sided businesses across different industries can achieve. Indirect network effects generate powerful demand-side economies of scale and scope, which, combined with technology, render industry barriers quite porous and easy to straddle with sound MSP expansion strategies. Witness the convergence of smart mobile phones, PDAs and digital music players, computers and cars (although we would not - yet - argue that Microsoft is competing against Toyota) and, most recently, mobile phones and credit cards. Indeed, since June 2004, NTT DoCoMo has equipped its i-mode handsets with contact-less chips and e-wallet functionalities, which allow their users to pay at thousands of physical points of sale (convenience stores, cafes, restaurants, movie theaters, airports) with a simple wave of their mobile phone. While during its first year, this was essentially a prepaid payment system called Edy¹⁰, very similar to JR East's Suica except for the "form factor" (mobile phone instead of plastic card), in January 2006 NTT DoCoMo took the additional step of launching a credit card-like service called iD, which signaled the beginning of competition with credit card companies.

Given the pervasive convergence which characterizes the new industrial era we live in, managers (particularly in the high-technology sector) should be aware that the most threatening forms of competition are those coming from lateral sectors. Conversely, imperialistic expansion into adjacent markets is oftentimes the most powerful strategy for MSPs - on condition that the target markets and the platform's functionalities match well. This requires a careful analysis of what drives and what limits MSP expansion.

4. Depth vs. breadth

Accordingly, we now turn to the case of companies starting off with an MSP (either as a start-up or from an established position) and looking to expand it.

¹⁰ Edy is a pre-paid electronic payment system created by bitWallet Inc., a company jointly established in 2001 by Sony Finance, NTT DoCoMo and several other firms. Initially available only on plastic cards with FeliCa chips embedded in them, Edy was adopted by NTT DoCoMo as the standard e-wallet function for its FeliCa-equipped i-mode phones starting in 2004. Like any other prepaid eMoney service, allows users to transfer digital value onto their Edy-enabled cards or FeliCa mobile phones, either through cash register readers/writers or through direct transfer from customers' bank accounts or designated credit cards.

The key strategic tradeoff when expanding an MSP is between *deepening* the fundamental functions performed for the existing sides and expanding to radically new functions, which might bring new sides on board. Going after new functions and customer groups without sufficient depth in the home base risks leaving open opportunities for focused competitors. On the other hand however, breadth is sometimes a sine qua non condition for generating a critical level of indirect network effects, needed in order to thrive or even merely sustain one's position against potential competitors – and avoid being vulnerable to attack by expansion from lateral industries.

Before delving into the analysis of the factors that drive and limit depth and breadth of MSPs, it is useful to start with a mini-case study of spectacular MSP expansions.

The evolution of NTT DoCoMo's i-mode MSP¹¹

In February 1999, i-mode was created as a two-sided platform connecting subscribers to DoCoMo's mobile phone network and mobile Internet content providers. Prior to launch, DoCoMo had signed up 67 content providers, handpicked by Takeshi Natsuno, its chief strategist. Mr. Natsuno sought a diverse portfolio from the beginning. Mobile banking, perceived as vital to the success of i-mode, had 21 sites. The remaining 46 sites covered gaming, fortune telling, news, sports, airline information, train and other travel information, real estate listings and weather forecasts. This variety set the stage for a marketing campaign that emphasized the myriad of amazing things subscribers could do with their mobile phones – aside from making phone calls.

i-mode gained one million subscribers in 6 months, 5.6 million in one year and 32.2 million in three years - in August of 2005 their number stood at 45 million. That is a remarkable market penetration for a premium service in a nation with a population of 127 million. The content provider side today numbers over 93,000 sites.

¹¹ The following mini-case study is based upon chapter 7 of Evans, Hagiu and Schmalensee (2006).

i-mode's rapid success was first and foremost due to a deliberate strategy of thoroughly reducing shared costs incurred by content providers in making their offerings available to users. Indeed, DoCoMo was careful to incorporate many web industry standards into i-mode: compact-HTML for the creation of web pages; hypertext transfer protocol (HTTP) for transmitting data between the phones and servers; the standard protocol (SSL) for transmitting the secure data needed for financial transactions over the internet. This made life particularly easy for content providers with existing Internet sites, which they could effortlessly port to i-mode. In addition, DoCoMo built a proprietary and sophisticated billing system, which was set up to charge users according to the amount of data they downloaded on the network rather than on the amount of time they spent online¹². i-mode's innovative billing system was made available to some content providers and enabled them to charge small monthly fees for their services. Users got the convenience of a single monthly bill, while content providers got reliable billing service for a fraction of the cost of doing it themselves.

DoCoMo chose to reduce asymmetric information regarding content quality through a simple two-tier certification system: a carefully selected subset of content providers (currently, 5,000 out of the 93,000 total) is deemed "official" by the operator, whereas the rest were not excluded, but were known to be unofficial, i.e. not endorsed by DoCoMo. Although there are no restrictions placed on non-official sites, there are certain privileges reserved to official content providers: they are directly listed on and easily accessible from the i-mode portal and they can piggy-back on i-mode's billing system in exchange for 9 percent of their i-mode revenues.

Over time, DoCoMo kept adding new features that made content and application development for i-mode easier and richer. In 2001, it included support for Sun Microsystems' Java programming language and launched i-appli, a service which allows users to download third-party Java software applications (games, e-commerce). Support for Macromedia's Flashplayer was added in the same way in April 2003. All subsequent i-mode handset models had Macromedia Flash Lite installed, allowing users to view interactive multimedia content, while Macromedia and DoCoMo released Flash content developer kits.

It is only after having significantly deepened its two-sided platform that DoCoMo embarked on a campaign of radical MSP expansions, which started with the addition of online auctions¹³ and culminated with the addition of payment systems since June 2004: debit, with the Edy pre-paid e-wallet function, and credit, with the iD credit card brand. This allowed DoCoMo to add a third side to its platform: physical merchants, who clearly benefit from allowing users to pay with their handsets at their stores.

¹² The latter option was championed by most other carriers at the time, who used the WAP standard. Despite some upfront cost benefits, this solution but was quite inefficient since there is no meaningful correlation between the time a user spends online and the network cost incurred by the carrier.

¹³ This was achieved through a 2004 joint venture with Rakuten, Japan's leading Internet shopping mall.

Still, as thorough and progressive as DoCoMo's MSP expansion strategy has been, it was by no means bulletproof. In particular, it left two doors open for KDDI's au service, i-mode's main competitor, which saw its market share go from 18 percent to 24 percent between 2002 and 2005 (i-mode went from 59 percent to 55 percent over the same period) due to its more rapid roll out of a 3G network, which made its content more appealing to users, and the Chaku-Uta-Full music download service for mobile, introduced in November 2004¹⁴ (i-mode has yet to launch its own). Whether DoCoMo's leadership in mobile-based contact-less payment systems can generate sufficiently powerful indirect network externalities to trump the music service advantage of KDDI remains to be seen¹⁵.

What drives and what limits depth?

Before venturing out to bringing new sides on board the platform, MSPs need to make sure they create all the value they can deliver to their existing sides. Depth creates more value for existing constituents and intensifies indirect network effects by making transactions among them more efficient or more frequent or both. This renders the existing multiple sides "stickier" and less likely to be attracted away to other platforms. Consider the example of eBay, which started as a simple auction engine allowing buyers and sellers to transact. Over time it relentlessly deepened its platform offering by adding functionalities that reduced both search and shared costs for buyers and sellers. The most important ones were PayPal (acquired by eBay in 1999), which offered a convenient way to settle transactions, and the Feedback Forum, a system which reduced asymmetric information between buyers and sellers by allowing buyers to rate sellers and making ratings public.

In contrast, an illustration of the dangers of overlooking depth is provided by Ticketmaster, a two-sided platform serving consumers and event venues (concerts, sports, etc.). Ticketmaster had enjoyed a near-monopoly position in the market for ticketing major live events since the early 1990s. However, until 2003, it used to fix ticket prices in collaboration with venues and lobbied lawmakers to ban reselling of tickets. This rigid price-setting scheme was quite inefficient as demand rarely matched supply with the prices fixed

¹⁴ KDDI first launched Chaku-Uta service in December 2002: at that time the service only allowed users to download 30-second ringtones, not full songs.

¹⁵ Interestingly enough, DoCoMo decided to license the technology underlying its payment systems (essentially the incorporation of a contact-less chip in handsets, done jointly by NTT DoCoMo and Sony) to both KDDI and Vodafone in order to accelerate its adoption by the public.

ex-ante, hence a large secondary market developed. At the beginning this market was mostly intermediated by scalpers, but the Internet brought about much tougher competition to Ticketmaster: eBay and specialized sites such as StubHub.com helped grow the secondary market to the point where it reached a size almost equivalent to the face value of all Ticketmaster sales in 2005. Looking to correct its oversight, Ticketmaster reversed its previous policies: it started to allow reselling on its own site (a service called Ticket Exchange) and to use eBay's auction-based pricing model in 2003. This long-due deepening of the company's platform offering sent its sales - primary and secondary - soaring, achieving 24% growth between 2004 and 2005. Ironically, Ticketmaster has also become one of the most active lobbyists *against* state legislations banning resale of tickets.

A critical dimension of platform depth is quality certification, which, as we have mentioned above, serves to reduce the search costs due to asymmetric information between the MSP's multiple sides. One key decision that managers need to make is the strictness of the platform's certification policy: it should be driven by a careful assessment of the importance of *quality relative to quantity* within the relevant platform side(s). For example, the tight leash that videogame console manufacturers keep over game publication on their respective platforms has its historical roots in the 1983 "videogame crash." At the time, the popularity of the Atari VCS 2600 console had attracted large numbers of "fly-by-night" developers seeking a quick profit: they flooded the market with poor-quality VCS-compatible games (that Atari did not anticipate and had no technological way of excluding), which undermined the consumer experience and drove high-quality games out of the market. This led to a collapse of videogame and console sales and ultimately to Atari's bankruptcy. Having learnt from this expensive disaster, Nintendo pioneered the security chip and the "seal of quality", designed to allow the platform provider to lock out any undesirable games from getting published on its console. Since then, all console manufacturers with no exception have adopted this model, although today there are large numbers of specialized magazines, which rate and review games, making a 1983-like crash highly unlikely, even in the absence of centralized platform control. The reason behind the persistence of the lock-out policy is that consoles need top-notch games taking full advantage of and showing off their graphics capabilities, which are considered to be the key drivers of console sales.

By contrast, in the case of NTT DoCoMo's i-mode service, the diversity of content was paramount: quality also mattered of course, but to a lesser relative degree, which is why NTT DoCoMo has chosen a simple two-tier certification system (official and non-official), with no exclusion.

The second key decision regarding certification is whether this function should be centralized – i.e. performed by the MSP – as in the videogame and i-mode examples, or decentralized - i.e. *enabled* by the MSP but performed by the platform constituents themselves. The latter approach was pioneered by eBay and also adopted by Internet video sites such as YouTube and Google Video: it allows buyers or users to rate sellers or content providers. Decentralization is a more sensible choice when information about “quality” is itself decentralized, i.e. when the MSP does not have a clear informational advantage over platform constituents.

As valuable as platform depth may be, there comes a point when too much of a good thing can become harmful. One pitfall is attempting to “overdo” cost reductions or seeing cost reductions where there are none (or too few). It is interesting to use eBay as an illustration yet again, this time with its 2005 Skype acquisition. On the face of it, voice over IP seems to contribute to reducing transactions costs between buyers and sellers even further, which was the main reason behind the acquisition. As it turns out however, many users were turned off by the availability of voice communication, which they felt put unnecessary pressure on them to use it – a potential intrusion in the comfortable anonymity of trading on the Internet. This illustrates how attempts to excessively deepen platform functionalities may create negative externalities as opposed to the positive ones MSPs are looking for.

Closely related to this point, one needs to be flexible when deepening shared cost reductions and not attempt to impose them on everyone even if they appear to be very valuable to some constituents. When it first launched Xbox Live, the online gaming platform associated with its Xbox console, Microsoft had designed the service as a closed proprietary system, complete with a standardized user interface (gamers had one single user identification no matter what game they played), billing system and middleware, all of which were imposed on third-party developers wishing to make their games playable online by Xbox users. By contrast, arch-rival Sony had adopted the opposite strategy for PlayStation

2's online gaming service: aside from a network adapter that PlayStation 2 users had to purchase from Sony in order to obtain online capability, each developer had complete control over the user online gaming experience for his game. This naturally resulted in much less standardization of the online user experience across games. Microsoft's approach was a very attractive proposition for small developers, since it saved them significant expenditures in infrastructure (a clear shared cost saving), although they paid a price in flexibility. It was a different story with large game developers - Electronic Arts (EA) in particular -, who preferred to design and run their own online games as they saw fit. Indeed, EA was reluctant to subscribe to a Microsoft-controlled service that limited its ability to differentiate itself from competing game developers. Faced with the perspective of seeing EA support only PlayStation 2's online gaming service (which would have put Xbox Live at a tremendous competitive disadvantage), Microsoft had no choice but to become more flexible and allow EA to control their online games for Xbox.

Thus, the general principle regarding shared cost reductions is to include only those functionalities which are sufficiently "horizontal", i.e. which benefit a wide enough range of the MSP's constituents. The boundary between what the MSP should contain and what should be left outside (in some cases to be provided by third parties) is critically determined by the MSP customer groups' demand for standardization on particular features. This demand can be very hard to ascertain *ex-ante*. However it is useful to keep in mind that oftentimes the main reason for which attempts to introduce standardization may provoke discontent among certain MSP constituents is that it inherently reduces their ability to differentiate themselves from each other, and thereby lowers the value they derive from being on board the MSP. The Xbox example above is a good illustration of this issue.

The risk of overdoing cost reductions also exists for search costs, though it can operate in more subtle ways. Here it is useful to start with a non-technological example: the design of Roppongi Hills, an 11.6 ha "mini-city" in the center of Tokyo, opened in April 2003 and encompassing upscale shopping space filled with trendy apparel stores, an eclectic mix of restaurants (Japanese and foreign), a spectacular Virgin Toho Cinemas movie theater, an outdoor arena for various cultural events, a television studio, two residential buildings, coffee shops, a book and DVD store and, last but not least, a spectacular landmark building hosting premium office space as well as a library, a cultural academy, an observatory and an

art museum. This grandiose MSP attracts 45 million visitors every year and many of them – including employees of tenant firms – observe (without necessarily complaining) that it is very difficult to find a specific place in the complex and very easy to get lost in the maze of levels, stores, cafes and restaurants. This is not negligence on the part of Mori Building, the developer of Roppongi Hills: if it had wanted to design the complex in order to minimize search costs between visitors and shops, Roppongi Hills would look quite different today. Instead, the developer believed that it would create more value by allowing room for “random encounters”, i.e. by inducing visitors to explore the complex. This particularly benefited some of the up-and-coming trendy shops located within the complex, which did not have a well-known brand name yet - but not necessarily the well-established ones, such as Zara and Louis Vuitton. This is one of many examples of balancing acts that Mori Building had to perform in designing Roppongi Hills to please its various constituents: its visitors are willing to tolerate some wandering around before finding their destination and in the process run into unanticipated shops and restaurants that may turn out to be of some interest.

Back in the technology world, an illustration of the value MSPs can create by allowing for mutual exploration between the various sides is Amazon’s recommendation software, which tailors product recommendations for each individual user based on their past transactions. Some of the exploration is voluntary on the part of the users but some of it is random in a similar way to the shoppers wandering through Roppongi Hills. Apple has also adopted this model by starting to offer individual recommendations for songs or albums on iTunes since September 2006.

The underlying principle is to combine effective search with the possibility for exploration (random or not), which increases the likelihood of transactions. However, unlike brick-and-mortar platforms such as Roppongi Hills, for which this combination entails clear-cut design tradeoffs (a space conducive to exploration inevitably makes search less efficient), in the more flexible software-Internet space, one can achieve both at the same time. iTunes can provide very precise search results by song, album or artist while still making loosely related recommendations on the side, tailored to each individual customer. Of course, even Amazon and iTunes are mindful not to crowd a user’s attention with too many recommendations, in order to avoid quality degradation of the overall service.

What drives and what limits breadth? (aka MSP imperialism¹⁶)

Whereas MSPs benefit from going deep in their functionalities to generate more value from the same sources, breadth of MSPs platforms is driven by the quest for unlocking *new* sources of value and creating new indirect network effects with the addition of new sides to the MSP. It can also be driven by the sheer necessity to survive: if your MSP does not expand into a new functionality or customer group, another platform, which already serves that group, might attack your home base by expanding in the reverse direction.

These are powerful reasons to expand platform breadth and they have led many MSPs, particularly in the technology sector, to imperialistically cross industry boundaries, which is the fundamental driving mechanism behind the “digital convergence” phenomenon (mobile phones, PDAs, digital music players and payment devices; PCs, television sets and videogame consoles), with disruptive implications for entire industries.

Aside from i-mode’s entry into credit payment systems, another example of radical MSP expansions is found in the videogame industry. At least since the last generation (PlayStation 2, Xbox, GameCube), videogame consoles are no longer just platforms for playing videogames. They have become full-fledged multimedia platforms, complete with DVD-playing and Internet browsing capabilities (thus adding at least two more sides) and a clear ambition to supplant all other devices (PCs, TV set, etc.) in becoming the MSP of choice in consumers’ living rooms. Unsurprisingly, both PlayStation 2 and Xbox 360, the first console in the current generation have been dubbed “Trojan horses” for taking control of the digital home).

The most significant consequence of MSPs’ expansive strategies is that they result in rivalries among companies that one would not have normally expected to see on the same competitive battlefield. Few would have thought of Microsoft and Sony as competitors prior to Xbox’s 2001 launch, although some had been anticipating the clash ever since it had become clear that PlayStation was set to expand beyond videogames. Far fewer would have imagined even two years ago that in 2006 NTT DoCoMo, a mobile carrier, would be competing against traditional credit card companies and a railway operator (JR East) in the payment system space.

¹⁶ The term “platform imperialism” was first coined in Evans, Hagiu and Schmalensee (2006).

Precisely because MSP strategies take companies into unfamiliar territories, it is oftentimes important to proceed with caution and not assume that bringing about indirect network effects will be sufficient to compensate for a lack of relevant industry expertise. In fact, a “*veni, vidi, vici*”-type behavior, in which an MSP enters a new industry and simply assumes the leadership position, is rarely feasible. Partnerships and alliances, even with potential competitors, may be necessary as a first step and require careful management of delicate co-opetition relationships. NTT DoCoMo’s foray into credit cards is again a good illustration: the operator has been quite cautious in its MSP expansion by entering a strategic alliance with Sumitomo Mitsui Financial Group (one of Japan’s leading credit card issuers) in April 2005 (prior to launching its iD credit card brand in January 2006) and then licensing it widely to established credit card companies, while providing assurances it would not directly enter the consumer credit card business in the “near future”. Most experts believe however it will do so within 2-3 years, when it will have acquired sufficient expertise with (and regulatory approval for) providing consumer credit. In an equally interesting twist, NTT DoCoMo has also partnered with JR East to launch Mobile Suica in January 2006 - a service that marries the railway operator’s successful payment system to the mobile operator’s *o-saifu keitai*¹⁷ phones. Thus, where many were expecting fierce competition, the two companies saw first an opportunity to jointly enlarge the pie of contact-less payment systems against conventional credit cards and plain cash. This of course will not preclude competition *within* mobile phone-based systems between Edy, iD and Suica.

Aside from the difficulties inherent in entering new industries, there are two other important factors that can limit MSP breadth. The first one is obvious and exists in any market, not just multi-sided ones: resource constraints (financial or human) may limit a company’s ability to expand by catering to new customer groups. The second factor however is specific to MSPs and may create a binding constraint well before the platform has reached the limits of its resources. Adding new platform functionalities can lead to potential conflicts of interest with the MSP’s ecosystem, which can hinder growth much more severely than a lack of resources. This presents managers with hard decisions: should the conflicts be “embraced” and managed or should the company in question resort to drastic tradeoffs?

¹⁷ Literally: “wallet mobile phones.”

One illustration of this difficulty is provided by SAP, the world's leading enterprise software provider¹⁸. Up until 2004, the company had focused on and built a strong reputation through reliable, comprehensive software application offerings for enterprises: Enterprise Resource Planning, Customer Relationship Management, Supply-Chain Management. In April 2004, SAP's management decided to launch a two-sided platform strategy: the firm opened the NetWeaver technology platform underlying most of its applications to third-party independent software vendors (ISVs), who were invited to build new applications on top of it and expand SAP's own offerings. While on the one hand SAP's strength in applications guaranteed third-party ISVs access to a large installed base of customers through NetWeaver, on the other hand it was also an intimidating factor for some who did not wish to compete with SAP on a platform owned and controlled by SAP. The company's executives recognized this issue and decided this potential conflict of interest could be managed: in other words, they decided that SAP did not have to choose between being either an application company or a platform company, but could in fact be both at the same time. SAP created industry groups containing enterprise customers from every specific industry, ISVs offering software solutions for that industry and members of SAP's corresponding industry solutions division. Within these industry groups SAP adopted the policy of clearly and credibly committing from the outset to those areas of enterprise software it planned to explore (as well as to the time horizon) and to those fields which it would entirely stay away from. This transparency made it considerably easier to attract third-party ISVs to NetWeaver.

Meanwhile, NTT DoCoMo opted to pre-empt all conflicts of interest with its content providers from the outset by deciding never to produce its own content, i.e. by limiting itself to being a pure platform, not a media company. It is interesting to contrast this approach with that adopted by Vodafone when trying to introduce a wireless 3G service in Europe similar to i-mode, around the same time the Japanese service was launched. In 2000, the British operator partnered with the French media conglomerate Vivendi to launch the Vizzavi service for mobile phones. In addition to its use of WAP, a very unattractive protocol for displaying content as we have seen above, Vodafone and Vivendi felt confident that the content guaranteed by Vivendi's ownership of Universal (Music and Studios) would be sufficient to attract a critical mass of subscribers, whereupon third-party content owners

¹⁸ See Hagiwara et al. (2006) for details.

would be quick to join. This never happened as third-parties were put off by Vizzavi's "closed garden" approach to content, which heavily favored Universal. Not surprisingly, despite Vodafone's and Vivendi's investment of 1.6 billion euros in Vizzavi, the portal's revenue and subscriber growth were both disappointing. After one year of operation Vizzavi had 2 million subscribers compared to i-mode's 5.6 million subscribers, and after about two years Vizzavi had only 4.2 million subscribers compared to the Japanese service's 21.7 million. By May 2002, the portal was spending 1.02 million euros per day without any profit in sight, and its stock market valuation, which had been 20 to 50 billion euros at the height of the internet bubble, had dropped to almost nothing by the time Vodafone bought out Vivendi's 50 percent stake in Vizzavi in August 2002¹⁹.

Does MSP expansion lead to more Winner-Take-All clashes?

A question that it is important to ask in this context of ubiquitous MSP imperialism: is the resulting competition necessarily winner-take-all? Perhaps counter-intuitively, the answer is: not necessarily.

Consider for instance the looming competition between mobile phones doubling as digital music players and Apple turning out an iPod phone: which of the two will end up subduing the other? It is very hard to predict which way and whether the market will tip. In fact, it may well be that the two devices will co-exist side by side. iPod as the best digital media player with the occasional mobile phone capability and smart mobile phones as great phones occasionally doubling as music players. In general, as MSPs straddle new industry boundaries and attract new sides, the value proposition to consumers acquires just as many new dimensions, making it increasingly likely that user preferences will be segmented along fewer dimensions and thereby creating sustainable market niches, in which different MSPs with different strengths can survive. As an MSP expands horizontally, it needs to trade off the synergies, economies of scale and/or network effects created by novel search or shared costs reductions against the increasing complexity costs and diseconomies of specialization, which occur when the platform acquires new dimensions. Thus, although being a platform with three or more sides can look appealing at first glance, being a dominant two-sided platform may be just enough. In such a context, depth trumps breadth.

¹⁹ Subsequently, Vodafone re-launched the service as Vodafone Live, adopting a strategy much more similar to i-mode. It is today Europe's largest mobile Internet service (in terms of subscribers).

5. Conclusion

The MSP design issues on which we have focused on in this article precede and oftentimes directly determine the choice of business models – pricing, distribution, etc. Strategic design defines the relevant space in which the MSP is operating, its multiple constituents and its competitors – actual and potential – in a word, its relevant ecosystem. However, designing and expanding MSPs is a complex and daunting process. Most importantly, it is a dynamic one: the most successful MSPs do not sit still; they are constantly evolving, increasing their depth and/or reach and in the process redefining their boundaries and those of entire industries.

This is especially true for MSPs in high technology markets, but, as we have seen above, even very traditional businesses can unlock powerful sources of indirect network effects – with a little technological help and a good amount of creativity. The devil is, as usual, in the details – mapping a firm’s individual operations into the three fundamental functions, using them to identify where “frictions” in interactions between existing and potentially new sides are and, finally, carefully choosing new activities that provide the largest possible search or shared cost savings leading to indirect network effects, all the while minimizing conflicts of interest on all fronts. The framework exposed above (and synthesized in the diagram included in the appendix) should be particularly useful in this context, as it induces systematic analysis of MSP strategic opportunities and the critical tradeoffs involved, based on fundamental economic functions and cutting across any specific industry setting.

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Appendix: Dynamic framework for designing and expanding an MSP:

