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Platforms win because of network effects

Business Platforms: Profiting From Networks

A quiet revolution is under way. It is a revolution that will leave a few far-sighted companies with a pervasive influence on our lives and most of our commercial transactions. Even though it is a very new development, no more than a year old, it is already a \$2 billion business for two of the leading companies.

It is a quiet revolution inasmuch as it does not receive any significant coverage in the press. Industry analysts are focused on new technologies, and while recent and evolving developments like Web Services are crucial in enabling this revolution, it is not fundamentally about software but about a new understanding of the business environment. The business press is only beginning to recognize that something extraordinary is happening in a few special companies¹, including Amazon.com, eBay, Google, and Salesforce.com.

In 2002, Amazon launched the Amazon Web Services (AWS) program to great excitement in the technical community and very little interest anywhere else. This event was the public beginning of the revolution.

A few weeks later, one developer used it to launch his own service whereby web site owners could easily create specialist on-line stores for their sites. After one year, this is a business with a \$5 million annual turnover. Not a bad result for a few sleepless nights writing code.

But the revolution is much more fundamental than this. It is not another dot-com get-rich-quick scheme but a fundamental re-evaluation of what constitutes core business and how market dominance can be achieved in an ever more connected world.

Talking to Jeff Bezos, the CEO of Amazon, shortly after the launch it became clear that his understanding of the nature of his business had changed. He no longer saw himself primarily as a bookseller or even as a general retailer. What he had realized was that his primary asset was a \$1 billion e-commerce engine. This engine had the ability to become an ubiquitous platform for information about any products or services and the trade in those same products and services. It could become a platform underpinning an infinite range of innovative uses.

The keyword is "platform". Platforms win in the business environment because of network effects. Your competitors may very well be able to copy your innovations, beat you on price, and deliver faster to your customers. But if you are the hub in a network, connecting otherwise separate people and businesses, then that is very hard to replicate. This is because the value of the network depends

critically on how big it is, so an almost-as-big network is not the same thing at all.

An historical example of a strong network effect is the telephone companies. The more of your friends and business contacts that are on the same telephone network, the more valuable it is for all of you. There is really no point in being the only one in town with a telephone. Similarly, there is little point in switching to a competitor's network unless interoperability between networks is guaranteed, ensuring that you can call everybody on the other exchanges. Historically, this has been achieved largely through government regulation.

In the current economy, mobile operators are only starting to wake up to the opportunities that owning the platform can bring. They face some interesting challenges in driving and promoting innovation and usage, while managing the increasing regulatory environment.

Three developments are coming together. They allow us to understand and profit from these opportunities in business platforms. The first development is a deeper understanding of the value of networks. Not all networks are the same and not all networks are equally powerful. We are now able to characterize different network types and predict their intrinsic value.

The second development is the ability to connect networks easily. This is the key to growing value. Part of this development is technology: new, widely adopted standards like web services are greatly simplifying the connections. But much more it is about social changes: many of our human and social networks are now electronically facilitated, primarily by mobile phones and the Internet.

The third development is an evolution of business practices. We now understand how to foster explosive creative innovation on a scale that has not previously been possible, and how to channel that innovation to profits. We now understand how to turn the potential value of networks and of connecting networks into actual profits.

Network Effects: Dominating Your Business

For our purposes, a network is any group of people or businesses coming together to interact. The actors in the network, are sometimes called "nodes" in the formal analysis of networks, though we will not adopt that terminology here. A modern supermarket is a connection between two networks: the suppliers and the consumers. By bringing together two large networks, the supermarket adds value and convenience to all the actors. In contrast, a market stall is usually a connection between a single vendor and his customers. The networks it brings together are smaller and so is the value of the connection.

**Three developments
enable business plat-
forms:
An understanding of the
potential value of
networks.
The ability to connect
different networks.
The business practices
to turn potential
network value into
actual profits.**

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A key observation from the analysis of networks is that while the value of a network obviously depends on the number of actors, the way in which this value increases is markedly different for different types of network. **Sarnoff's law** is valid for linear networks and says that the value of the network grows with the number of actors. The law emerged from the advent of radio and television networks in the early twentieth century in which a central source broadcasts to a number of receivers. The value of an advertising slot on television or radio is proportional to the number viewers or listeners it reaches. Sarnoff's law applies to many networks with this one-to-many behavior.

In contrast, **Metcalf's law** is good for networks that allow paired connections, and says that the value of the network grows with the number of possible connections; in other words with the square of the number of actors. Classical examples include telephones and e-mail: neither of which are any use if you are the only one who has it, but they become an integral part of your life when all or most of your friends or contacts are connected.

The key point about Metcalfe's law is that, because the growth in value is faster than just the increase in the number of actors, simply interconnecting two independent networks creates value greatly exceeding the combined values of the original two unconnected networks. Our supermarket example falls into this category. Another example is classified ads: the bigger the marketplace the better for both buyers and sellers.

Finally, **Reed's law** observes that when a network allows the users to form groups then the value of the network grows exponentially with the number of actors, taking into account the many group-group connections that are now possible². In this case, combining two unconnected networks can create tremendous value.

The growth profiles of these three laws are illustrated in figure 1 below.

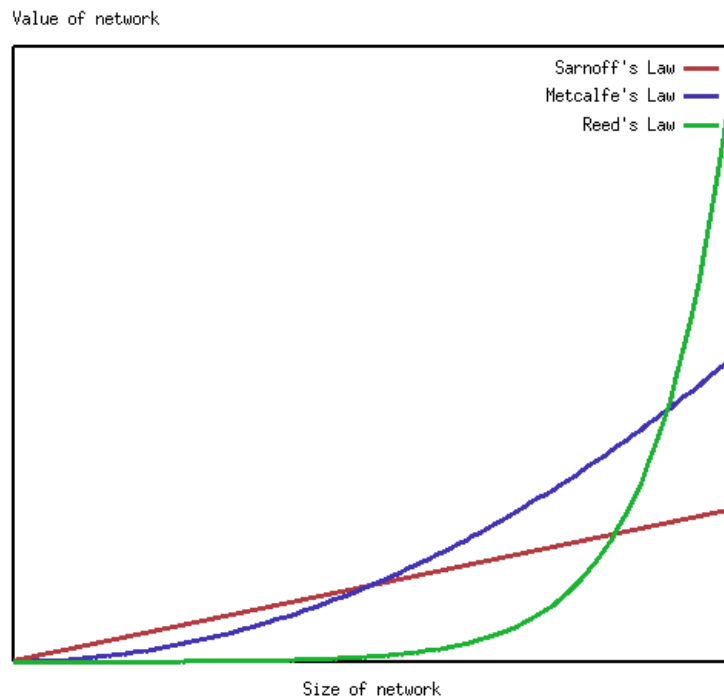


Figure 1: The value of the network depends crucially on the network type.

Group formation often happens naturally when the networks are large enough and the infrastructure allows it. While person-to-person e-mails may have been the original “killer application” for the Internet, it was quickly followed by mailing list, newsgroups, chat rooms and even the world wide web—all supporting groups of people with shared interests.

Examples of large commercial applications of this are just starting to emerge. EBay, the Internet auction service, allows its users to build communities and areas for specialized auctions. Amazon has user reviews on their web site, and allows everybody to create lists of recommended items for any topic, thereby providing the beginnings of a community infrastructure. More importantly, Amazon is expanding their infrastructure to allow much more direct connectivity of buyers, sellers, and other parties, as we will discuss later.

If this all sounds a little theoretical, then the key messages is this: The higher up the network value chain (Sarnoff – Metcalfe – Reed) you can place your business the better, for two reasons.

First, the value of your network increases vastly. The value of business opportunities for joining disconnected networks increases even faster, leading to a “winner takes it all” situation: the company benefiting from the larger network can afford to pay more to grow the network because that growth genuinely represents greater value than it would for a competitor with a smaller network.

Second, the “stickiness” of your network increases. Most people could give up television (Sarnoff's law) and continue their lives reasonably unaffected. Giving up the telephone or e-mail (Metcalf's law) would involve much more disruption. And once I have invested my time and effort in building communities and social groups (Reed's law), leaving the network involves a huge cost, both physically (time, money, effort ...) and emotionally. Some of the most stressful events in human life like moving home or changing jobs are exactly the ones that involve the disruption of social networks.

This is where you find market dominance. Other companies could replicate (and, indeed, have replicated) most of eBay's online auction and trading systems. However, the usefulness of a trading platform depends on the number of buyers and sellers. What eBay's competitors can not easily do is to replicate the huge loyal user base that eBay commands. This is why the only threat comes from companies like Amazon and Yahoo that already have a large user base as a result of their own platforms.

Connecting People: Creating Value

Each day, over 3 billion text messages are sent on the world's GSM mobile networks³ and over 30 billion e-mails on the Internet, with about half of these being person-to-person e-mails⁴. One in every six Americans—53 million people—visit online chat rooms each month⁵. On one current estimate, there are 42 million web sites⁶.

Human social networks have changed. Not in their nature, they are still the same friendships, business relationships, and communities that we have always known, but in the way that they are facilitated.

At the risk of stating the obvious, human relationships are increasingly organized and enabled by electronic communication methods like mobile phones, e-mails, and web sites. Even for the two-thirds of us who still prefer face-to-face meetings over any other form of communication⁷, there is no doubt that the way we arrange meetings are increasingly taking advantage of electronic media, whether they are corporate e-mails, dating sites, or simple text messages. More and more we are even using these media as the primary communication. Online shopping for books, groceries, or memorabilia, e-mails to the family member living abroad, online chat rooms, discussion sites and web logs are all examples of relationships where electronic communication is the dominant or exclusive method of interaction.

Electronic networks can easily be connected, thereby releasing their combined value. Exactly how easy depends on the details of the network, but compared to shipping people by horse and carriage from one town to another, it is easy. How much easier is it for

Human relationships are increasingly organized and enabled by electronic networks that can easily be connected to release their combined value.

you to send a personal invitation to ten people by e-mail than by traditional letter? To 100 people? The Junto debating society⁸ could only gather about a dozen people from a small geographical region, while an contemporary online discussion forum may attract 10 million unique visitors per month with several thousand comments each day⁹.

The technical aspects of integrating disparate networks have been greatly simplified. New standards like web services provide widely-adopted methods for connecting systems and services on the Internet. The mobile industry is slowly coming to grips with the problem of providing a platform for the provision of mobile services and products, including third-party games, chat rooms, and downloads.

Building a platform is a solved technical problem¹⁰. Connecting networks is a solved technical problem. While the technology of integration may not yet be trivial, in particular with newer networks like mobile telecommunications, technology is not the issue.

The real challenge is a business challenge.

Business Platforms: Exploding the Network

Before launching their Web Services platform, Amazon already realized that their infrastructure had value beyond the simple purchase of goods.

Tim O'Reilly, founder of the eponymous publisher specializing in heavy volumes on information technology, was using a small software program to scan the Amazon.com web site¹¹. He is not interested in buying books, but interested in information about books, relevant to him as a publisher. For a given subject, he wants to know how many pages a typical book has, what binding is used, and what is the price range. By looking at the most popular authors and publishers, Mr O'Reilly can spot writers or editors that he wants to encourage to join him.

Amazon eventually discovered his scanning program and blocked it from accessing their site. After some discussions they let him back, but in the process they had realized that their information had additional value. The page count for a particular book wasn't just useful to customers, but potentially to a whole range of users.

Being of value to many groups of people is the foundation for benefiting from network effects. Two challenges arise, however. First, to bring networks together, you have to identify them. How can you foster innovation in the uses of your services and infrastructure to make the visibly relevant to new communities and to attract these communities? And second, how can you make sure you profit from the subsequent integration of these networks of communities? It is all well and good that connecting networks has

potential value but the release of that potential value has to be turned into hard dollar profits.

Innovation

"I can not hire all the good people," explained Mr Bezos at the first developers conference for the new Amazon Web Services (AWS) platform. Innovation within a single organization will only take you so far. You can not have all the good ideas, you can not think of all the ways that people can benefit from your platform.

The business principle is this: focus your own resources on the platform and encourage outside innovation in the connections. The value comes from connecting previously disconnected networks and this is the part of the solution that you must own as a business. Identifying the networks and making your platform relevant to their actors is an area where you should promote innovation and experimentation: this benefits everybody.

That is exactly what Amazon did. The AWS platform gives any developer anywhere in the world access to all of the data that Amazon holds and all of the business transactions that they support. You can look for stuff, get information about stuff, buy stuff, sell your own stuff, and much more.

The result was an explosion of interest and activity. Immediately, even during the "beta" program before the official launch, developers from all over the world grabbed the documentation and started to innovate. New applications sprung up almost overnight. More developers downloaded the kit, and the servers at Amazon that supported all these applications quickly had to be upgraded.

A new network had sprung up: the network of Amazon developers. It had never existed before. Amazon was a closed system and therefore Amazon had to do all of the work of bringing people to them¹². Now people from all over the world were actively using the Amazon platform to provide new services and business practices.

Profit

Innovation is good and may in itself bring real benefits and profits, as in the Amazon case study in the box.

A different story is provided by the Netscape case study where innovation was extremely successful in the technical sense, but where the company eventually had to exit the particular market. We summarize it below as a cautionary tale that innovation in itself is not enough: you must also manage your business and its transformation.

The business models for successfully managing innovation has evolved dramatically since the Netscape case study, and there is no reason why future innovators should fail.

However, the real value comes not from innovation but from bringing together disconnected networks. We have seen the *potential value* of doing this and how it depends on the type of network and its scaling law. How do you turn this into *actual profits* for your business?

An example is provided by Salesforce.com. One of the few ASP companies to survive and even thrive after the big dot-com bust, Salesforce.com provides on-demand hosted customer relationship management (CRM) solutions, currently supporting some 94,000 users from almost 7,000 companies or individuals.

They have a platform. The platform is a hosted software solution rather than an e-commerce platform like Amazon or eBay, but it is a platform. The network effects so far are weak, but the company has been successful. The question was how to leverage the platform. Their answer is Sforce: an open interface to their platform available to anybody as a free download on their web site¹³. Officially launched on June 3, 2002, they had 25 companies registered as developers with firm product plans on the first day with 11 applications already available. Less than two months after the initial announcement, the developers' showcase on their site shows 38 available products using their interface.

Case Study: Business Innovation for Amazon.com

As an example of business innovation, one independent developer has created a service where you can make your own online store trading in specialized items. The idea is that if you have a web site on bicycles, say, then you can easily link to a store branded to you and containing books about bicycles, videos of great cycling trips, the bicycles themselves, and accessories like outdoor clothing or GPS navigation. Everything is configurable with only a few mouse clicks, and because no programming is required it enables a whole new group of people to have their own store front online, extending the network of Amazon users.

The business innovation is in the commercial model. Amazon runs a referral program where they pay registered web site owners a small commission for sales generated from their sites. It works like this: the web site owner places a link from his site to Amazon for each of the products he recommends. Embedded in the link is a code that tells Amazon who the web site owner is, and when a customer buys an item after having followed one of these links, Amazon pays the web site owner a small commission, usually about 5% of the sales value.

In this case, instead of taking a hosting fee, the developer would take a percentage of your referral fees from this program automatically. The result is a business worth about \$5 million per year.

"We could have spent man-years and large sums of money developing an extension to the Associates program to allow you to sub-contract parts of your Associates fee," noted Mr Bezos. Instead, this business issue was solved by a single person in Germany with no involvement by Amazon. Such is the value of innovation.

**Moving from Sarnoff's
Law to Metcalfe's at
Salesforce.com**

Using their interface and, crucially, using their platform, thereby generating revenues to the company for every additional user.

The products and solutions developed by independent developers and companies provide features and integrations that Salesforce.com could not have developed on their own. They reach more customers than Salesforce.com could have reached through their own efforts. All this means more users of the platform.

By extending their network to include developers, they increase the size and therefore the value of the network. The value of this developer's network follow Metcalfe's law in connecting many-to-many: many developers connecting with many businesses, as opposed to the previous one-to-many Sarnoff network of Salesforce.com connecting with many customers.

"We hope to spawn an industry based on a new model," says the company's founder Marc Benioff¹⁴. Ambitious, perhaps, but entirely possible. Maybe even inevitable, given the power of network effects.

The Opportunity

Amazon does not disclose revenues from their web services program, but other services generated \$246 million revenues in 2002. A year after the launch, Amazon had 27,000 registered developers¹⁵. Their site lists 22 extensively developed applications for buying, selling, and managing content and information. As the Web Services program really takes off in 2003 and is now available

Case Study: Innovating the Netscape Web Browser

Opening up your software to any developer has had a bit of a bad name. Perhaps by now the classical example is Netscape's Open Source initiative Mozilla. Netscape produced a web browser program but was faced with increasing competition and disappearing profit margins in this market. This was mainly due to Microsoft's free bundling of their competing Internet Explorer software with their ubiquitous Windows platform. Netscape decided to donate their browser code to a not-for profit organization and invite everybody to contribute.

Technically, the result was a success. The Mozilla browser is one of the best on the market and it contains many truly innovative features.

Economically, it is a more difficult story. Netscape takes the core Mozilla browser, adds certain proprietary elements, and sells the result as the Netscape browser. While they have certainly benefited from the time and effort of hundreds of free volunteers, it was never a great money-spinner.

The problem was that while Microsoft could leverage their Windows platform in what became known as "the browser wars", Netscape had no equivalent platform. Today, the Netscape company is no longer a separate entity but part of AOL Time Warner, who recently decided it would no longer produce the Netscape browser but transfer all the assets to the Mozilla organization.

Revenues from business platforms may currently be running at around \$1.8 billion annually for Amazon and eBay alone.

internationally, it will be interesting to see how fast the services revenues grow.

eBay is a pure play on community services and business platforms with revenues currently almost \$1 billion on an annualized basis. Currently, about 1/3 of their auction listings are generated by their web services API¹⁶. In other words, web services represents about \$300 million revenue for eBay¹⁷.

Assume for a moment that web services generate or soon will generate a similar proportion of revenues for Amazon. With revenues of about \$4.4 billion¹⁸ and \$1 billion for Amazon and eBay, respectively, that means web services may be generating about \$1.8 billion revenue for these two companies alone.

While eBay has been slower at encouraging third party innovation, they have been aggressive in extending the core infrastructure, most recently with the acquisition of PayPal, an online payment service.

Salesforce.com charges a monthly fee of \$50 per user and \$1 per megabyte for customers using the Sforce framework. User numbers are not yet available, but as a point of reference Salesforce.com currently has 94,000 users. The adoption of their service has been limited in large enterprises because of the difficulty of enterprise integration—precisely the problem Sforce is solving. I expect many more users in the very small and the very large organizations: small, because of industry-specific offerings (e.g. for lawyers, accountants, logistics...) and large because of the cost-effective integration and total cost of ownership. (Medium sized businesses, the core of the existing user base, may prefer to stay with the vanilla offering.)

As each grow their networks they become more and more pervasive platforms that we may not even notice or know about, unless we happen to be shareholders in one of these successful companies.

The Future

How many platforms can the world sustain? Not many. It is the network effect again: it is much more valuable for both buyer and seller to be on the largest platform.

One general shopping platform, one auction platform, one search platform and so on. Some platforms could have geographical limitations and therefore allow several to exist: there is no reason why most people would prefer a global dating platform to a local one. Some may have industry limitations and again allow complementary offerings.

Companies who realize the potential will seize the opportunity. Extending their existing platform through technological innovation and strategic business alliances, they will grab the network. Posi-

tively encouraging interfaces through open, widely adopted standards will cause an explosion of business innovation, greatly increasing the value of the network and thereby the platform.

The companies who successfully execute this strategy will be the winners. Their competitors will be forgotten.

The challenges are twofold.

Execution is not trivial: it requires new skills and business practices, and it is difficult to achieve the required speed of execution.

First, execution is not trivial. There are new skills and business practices involved. Amazon took several months to find an effective way of interacting with the developer community—something they had never had to do before. Timing is essential, and an aggressive business plan will give the best results. Even then, it took Salesforce.com over a year to launch Sforce, and Amazon about nine months to make their services available internationally. Today, we are still watching eBay for a substantial opening of their platform.

The challenges of being a monopoly or a near-monopoly must be addressed.

Second, as the company becomes successful, regulatory risk increases. If there is really room for only one trading platform, then the winner in this race is per definition a monopoly. Examples include the legal challenges faced by Microsoft over their dominance on the desktop, and the regulatory environment under which fixed-line telephone companies operate in most markets. Winning companies, especially those serving the consumer market, will be conscious of this risk and take steps to mitigate it during their growth.

These challenges will be overcome: the rewards are simply too great for any other outcome.

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NOTES

- 1 Business Week has good coverage of the business implications of web services at http://www.businessweek.com/technology/tc_special/03web.htm
- 2 For David P Reed's own discussion of his eponymous law, see <http://www.reed.com/Papers/GFN/reedslaw.html>
- 3 Howard Rheingold (2002): *Smart Mobs*, Persus Publishing. This volume is a good general introduction to some of the social aspects of networks and network effects, and is particularly useful for introducing the trust issues that are inherent in large social networks.
- 4 E-mail volumes from: http://www.idc.com/getdoc.jhtml?containerId=pr2002_09_23_113035.
- 5 Business Week quoting Nielsen/Net Ratings at http://www.businessweek.com/technology/content/jun2003/tc20030610_1865_tc104.htm
- 6 Netcraft has 42,298,371 sites in their latest poll; see http://news.netcraft.com/archives/web_server_survey.html
- 7 Reported by the BBC: <http://news.bbc.co.uk/1/hi/business/1396616.stm>.
- 8 Benjamin Franklin founded the Junto in 1727 with twelve friends, and the club lasted for 40 years, eventually giving birth to the American Philosophical Society.
- 9 The OSDN networks is certainly not in the same intellectual league as the Junto, but their statistics are readily available (<http://advertising.osdn.com/>). Just one of their sites (slashdot.org) has had over half a billion hits since September 1997.
- 10 There are a few outstanding issues regarding things like security and resource descriptions, but they are issues of standards, not of technical impossibilities.
- 11 Tim O'Reilly's spider program was discussed at the first AWS developer's conference. There is some debate as to whether Amazon did in fact block the spider: Mr O'Reilly told me that they did at the conference, but in later private communications with Amazon my contacts speculated that the story was apocryphal.
- 12 Notwithstanding their successful Associates programme. This is a referral programme where web site owners place adverts for Amazon products on their sites in exchange for a small percentage of sales. It has been very effective in driving sales to Amazon, but still depends on internal resources for coding, support and, crucially, generating new ideas. The increasing complexity of maintaining the complex links and adverts available to Associates members, was one of the initial drivers for the web services programme. More information about the Amazon Associates programme is available online at <http://www.amazon.com/exec/obidos/subst/associates/join/associates.html>
- 13 Sforce is online at <http://www.sforce.com/>.
- 14 Quoted in *The Economist* magazine; the article is available online at http://www.economist.com/business/displayStory.cfm?story_id=1826138.
- 15 Source for the size of the Amazon Web Services developer community and for Amazon services revenue: http://www.businessweek.com/technology/content/jun2003/tc20030624_9735_tc113.htm.
- 16 Private communications.
- 17 With \$1 billion annual revenue and 1/3 of the listings generated by web services, this business is worth \$333 million revenue if the listings generated by the web services are representative of the overall listings. I don't know if this is the case, but it seems a reasonable assumption.
- 18 For the six months ended 30 June 2003, Amazon revenues increased 32% to \$2.18 billion. On an annualized basis, that is the \$4.4 billion in the text.