marketplace ecology

managing the interconnected market groups of the Internet

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First distributed as an aQtive internal document in June 1999. Some examples have been rewritten where they referred to aQtive products that may not be familiar to the reader. As it was originally an internal strategic document the language is imperative and direct. This has not been changed.

principles

Traditional marketing focuses on a group of people who can be addressed as a single group for advertising and PR purposes, sharing common traits and likely to be influenced and reinforced by one another's adoption of a product.

The Internet is characterised by many interconnected groups, each with different goals and aspirations, but which influence and interact with one another. Each group could be addressed as a single market, but greater growth can be achieved by exploiting the web of interactions in the marketplace ecology of the Internet.

Our aim is therefore to understand the complex dynamics of potential target groups in the Internet and to position products that exploit these dynamics to achieve maximum growth and revenue potential.

why consider interactions

Imagine a Australian sheep farmer. He has virtually unlimited land, but only 100 sheep. Each year he shears his sheep and sells the wool at market. How can he increase his income? He may feed them better so that they produce better quality wool (increase inputs), he may spin and weave the wool into cloth (higher value outputs). However, if he is a sensible farmer he will also breed the sheep so that his flock grows in size. Managing interactions typically results in far greater long-term growth than simply managing inputs and outputs.

an ecology?

For many years biologists looked primarily at single animals and their adaptation to and life within an environment. It is only comparatively recently that ecologists have studied the complex web of interactions within the environment. The dynamics of the marketplace has some similar features, hence we borrow some of the language of biological ecologies, although the match is not perfect and there will be some 'mixed metaphor' at times.

growth

Interactions are of several different kinds. Some have definite direction: for example some people read web pages but do not produce their own; some are more mutual: for example users of chat rooms. These interactions produce different growth potential.

direct contact – linear growth

The simplest effect is when one only addresses a single market with no word of mouth or other growth effects. In this case each £1000 spent results in a fixed number of users (hopefully resulting in more than £1000 of company value!). For example, we advertise, people see our advert, download our products from the web and become users. If the users like the product and keep using it we have, for a fixed monthly expenditure, a fixed number of new users each month and hence a linear growth in total users with time.

Just as the farmer fertilises the land to make bigger crops, we can increase the rate of this growth by increasing the amount we spend, the effectiveness of advertising, etc., but the growth remains linear for fixed expenditure, just with a steeper slope.

multipliers – steeper growth

If we have two user groups A and B, where members of group A, once recruited, tend to recruit (infect) several members of group B, then we can direct effort at group A, but achieve growth in group B. For example, if group A are IT managers and group B are ordinary corporate users. For each IT manager we recruit we may indirectly obtain hundreds of users as our system is installed on central file servers.

This results in linear growth still – each £1000 spent on promotion gets one or more IT managers who each recruit 100 end-users. The number of end-users increases linearly, but 100 times as fast as the number of IT managers.

Other examples of this kind of interaction are gatekeepers, evangelists within target sub-groups and journalists – for each journalist we recruit we may influence many 1000s of end-users.

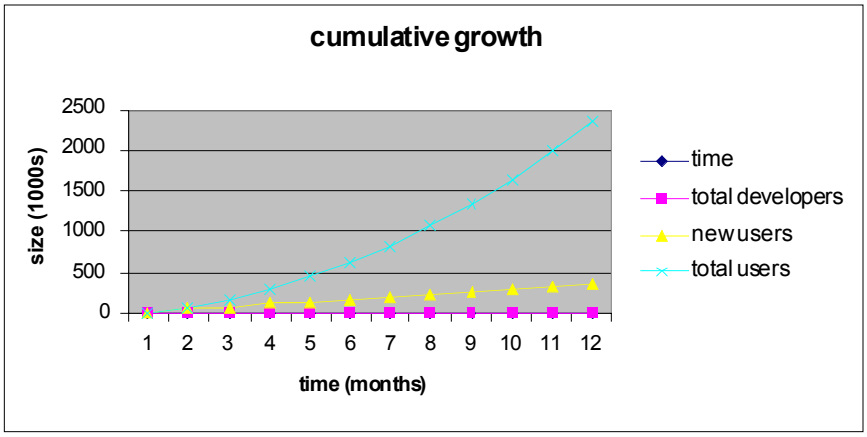
cumulative effects – quadratic growth

We can achieve greater growth by exploiting effects that build on some cumulative feature.

We can exploit this in two ways:

Revenue – If each user we recruit buys only once we achieve income proportional to the number of new users we recruit. However, if they have some form of subscription, or repeatedly buy new products, then we achieve income in any period proportional to the total number of users we have ever recruited and hence revenue that is quadratic over time.

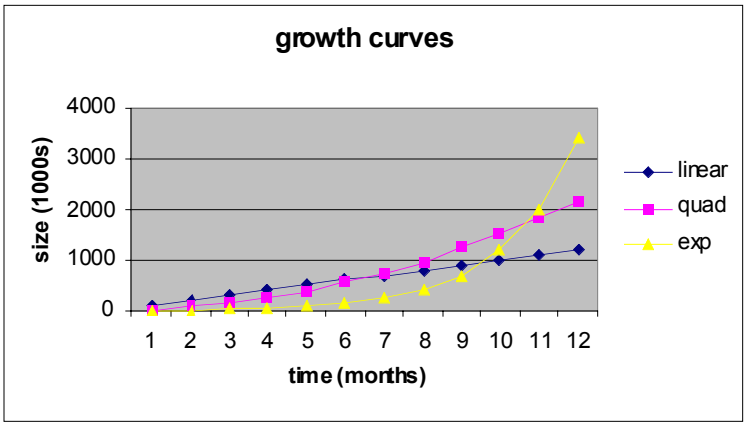
Growth – Better still is if we can obtain new users proportional to a linearly growing feature. This happens with the web-developer – web-user interaction. Assume we have a web developer product that advertises/promotes an end-user product when used on the web For example if it has a 'powered by' logo, or better if it has a companion end-user product.. Each web-developer we recruit has one or more web sites. If we recruit a fixed number of web developers each month then the total number of web-developers and hence web sites grows linearly. However, most web sites have a high turnover of visitors, so it is likely that *each* site will itself recruit a fixed number of new web-users. This means that the number of new web-users increases linearly with time and hence the total number of web-users increases quadratically.



Of course combinations of cumulative revenue mechanisms and cumulative growth do better still, especially with multipliers!!

feedback – exponential growth

By far the greatest long-term growth occurs when we have some sort of feedback loop. This is evident in the screech of feedback in a microphone or the rapid growth of insect pests. Insects breed and hence the number of new insects is proportional to the current population size. The progeny themselves breed, etc. The result is exponential growth where the number of individuals increases by a factor each period. If a population doubles each month then it multiples 1000-fold over 10 months. Exponential growth ultimately outstrips linear or quadratic growth, no matter what their growth factors.



In the Internet market (and indeed any market) feedback occurs by word of mouth. If enough users tell their friends one can achieve exponential growth with no additional effort! Of course, this is an uncertain growth strategy as we must not only be better than other products, but also be more interesting than any other topic of conversation!

Happily, the web is a publishing and communication infrastructure and there is a close tie between Internet product use and the opportunities for gossip. This in itself increases the likelihood of word of mouth recommendation (or at least word of email). In addition, we can specifically target products that exploit the communication potential of the Internet and encourage proliferation. We have already identified that one of the future large markets for truly end-user Internet use will be the informal sharing of pictures, messages, etc., amongst families and friends. Products that facilitate such sharing naturally encourage users to recruit other users (to see what they have shared) and thus form a feedback loop.

Products for web developers to put on their own web pages (such as branded search engines) also fit into this category as other web developers see the pages and may decide to adopt our products. In addition, of course, ordinary web users see the logo and products and are tempted to try for themselves.

multistage feedback

Some feedback loops operate directly – users talk to each other, web developers see other developers' web pages. However, others are indirect. The lattice of value exploits this: web users see a web site with product A and so download complementary software product B to make them better still. After a while the number of users of product B encourages other web developers to use product A, these sites are seen by yet more users … Other forms of market pull can be seen in a similar light.

Multistage feedback may easily be missed and emphasises the importance of looking at the full marketplace ecology, not just isolated parts.

managing the marketplace

Identifying the potential interactions, multipliers and feedback mechanisms is only the first stage, we need to develop products that maximise the potential of this marketplace.

vectors

This is borrowing a term from infectious disease terminology. In the spread of malaria, the mosquito is the vector that carries it from host to host. For the same two host groups there may be more than one vector that can cross-infect. In the Internet community, communications are technologically mediated, hence we must consider the vectors between groups as well as the groups themselves. News groups form such vectors for word-of-mouth referral between the more techie parts of the community; email and to some extent chat rooms act as vectors for the wider Internet community. Of particular note are web pages which form a potential vector between web-developers and web-users.

For word-of-mouth communications this includes email etc., but of particular importance are, web page tools, which make use of the web-page as a vector between web-developers and web-users.

We can take advantage by creating products which themselves embody or enhance existing vectors. Web development tools take just such advantage of the web page as a vector. In addition, we can create strategic products that form new vectors – the web-sharer products fit this niche exactly.

fecundity

One crucial parameter for growth is fecundity – how many additional users does each user recruit? This needs to be estimated or measured for each potential vector. Some factors that determine the fecundity are beyond our control – how many people does each existing user send emails to each week, how many people visit a web page, etc.

Strategically we can use fecundity in three ways:

1. select vectors with high fecundity
2. increase the fecundity of existing vectors
3. increase the fecundity of new vector products

An example of (1) is the techie community – high level of electronic communication, high propensity to discuss products, high probability of downloading and trying new products. Another example would be the targeting of developers of large web sites, or PR approaches magazines with larger (appropriate) readership.

An example of (2) is when our web tools make us more prominent on web pages. A tool to help build interesting roll-overs may make web developers like us, but doesn't make us prominent. In contrast, the ability to have a branded applet on third party web pages both enhances the web page and brings us to surfers' attention.

Another example of (2) is simply making our products more exciting and sexy, hence increasing the likelihood that we will be discussed on emails, newsgroups, etc.

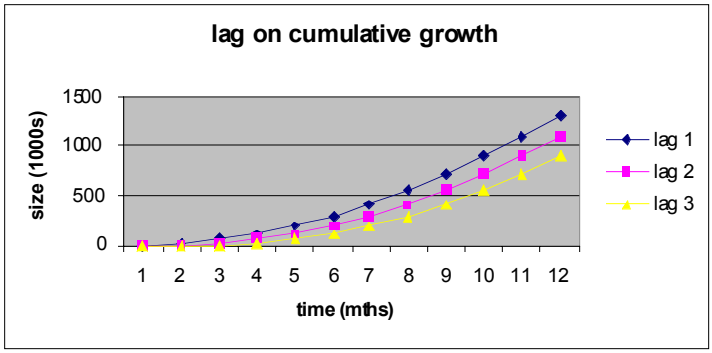
Looking at (3), web sharer products by their very nature are vectors. Easy production of an on-line photo album may mean someone who might not have mounted a web page (or one that others visit!) becomes a 'publisher' to friends and family. Similarly, vfridge creates a new communication channel. We must clearly make these easy to use and easy to share. Of particular importance is making sure that these can be used with new recruits before they need to download from us. Recruitment to web-services is far less costly for a new user than a download.

lag

As important as fecundity is the lag between the recruitment of a new user and when, via a particular vector, there is an effect on other potential users.

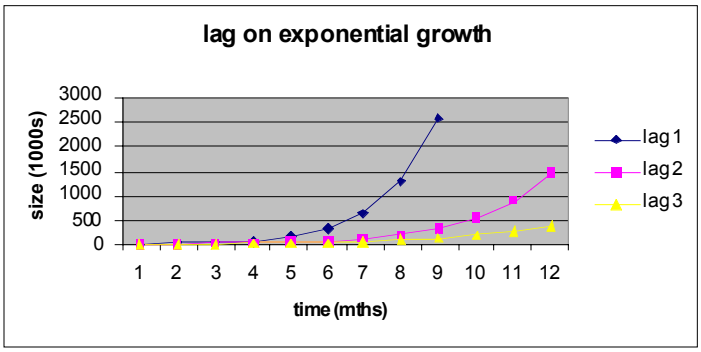
For linear and quadratic growth a lag in the multiplier effect simply means that user base (and eventually revenue) will lag by an equivalent amount. Where growth is investment driven, such lags have an obvious serious impact on cash flow, especially for more rapid growth.

Given the heavily electronic nature of our business, our own costs are not too strongly linked to growth, so although lags have an effect on projections, they are perhaps less serious than for a more traditional materials-heavy business. (Although it should be noted that, with quadratic growth, the effect of a one-month lag can look quite dramatic on any single month's figures.)



Of far more significance are lags in feedback loops. If we project that each new user will recruit on average 3 new users after a 2 month lag, this would mean a 1000-fold increase in user base in approximately 12 months. If,

however, the lag can be shortened to 1 month, then the same 1000-fold increase will occur in 6 months. Changing lags in feedback loops can shrink or stretch the time for eventual growth. This is part of the reason for the success of many insect pests, they reproduce very rapidly, often with life cycles of a few days (and large fecundity). A few days wait in dealing with such pests is the difference between a minor problem and annihilation of a crop.



Strategically this means we can:

1. seek vectors with both high growth factors and short lag!
2. choose between high growth factors with long lags and low factors with short lags
3. encourage shorter lags in our own products

Obviously (1) is the ideal, but more often we need to make choices. If we have a choice between a vector that gives us a growth factor of 10 with a lag of 3 months and a different vector with a growth factor of 3 with a lag of only 1 month, the latter is the better. The mathematical formula that captures this is:

$$\text{long term growth rate} = \frac{\log(\text{fecundity})}{\text{lag}}$$

Alternatively, putting growth and lag figures into a projection spreadsheet allows us to see the results of such options!

Looking at (3), this is where we can again tailor our products for strategic advantage. Having versions of our products that can be used via a pure web interface is an example of this. We will normally want eventual downloads to establish brand loyalty, but potential users, even if they eventually do download, may delay doing so. Easy, rapid alternatives can reduce take-up lag and hence increase long term growth rate.

fecundity profile

For modelling market growth and revenue we can use a fecundity profile. For each vector V we have a source user group G_A and target user group G_B. The fecundity profile gives, for each new user from G_A, the number of new users they will recruit due to the vector V from group G_B in each month. A simple multiplier of 10 at a lag of 2 months would give the fecundity profile:

vector	source	target	mth 1	2	3	4	5	6	7	8	9	10	11	12
V	G_A	G_B	0	10	0	0	0	0	0	0	0	0	0	0

In contrast, a cumulative factor (such as new users from web pages), will have a long tail – each month a fixed number of new users are recruited:

vector	source	target	mth 1	2	3	4	5	6	7	8	9	10	11	12
web pages	developers	web users	3	3	3	3	3	3	3	3	3	3	3	3

Note that for a feedback loop it is usually the first few numbers which have the dominant effect.

multistage interactions

There are two main kinds of multistage interaction:

1. those which are effectively one way.
2. those that involve some form of feedback loop

The Java-developer to web-user route is an example of (1). aQtive has a component-based end-user product onCue. Java developers can add develop their own components for this and distribute them with onCue. The Java-developers potentially influence one another (via newsgroups etc.) with a resulting exponential growth rate in onCue use, but then they push their products, giving us new onCue recruits. This gives rise to a group of onCue users which grows exponentially with the same growth rate (albeit lagged and multiplied).

The lattice of value with market pull has aspects of both these: web-developers and web-users each have internal feedback loops. However, if we focus on the interaction, there is an indirect feedback loop with a fecundity that is the product of each multiplier. The web-developer to web-user multiplier will be quite large, but the market pull factor will be small (many users needed to influence each web-developer). Furthermore the lag will be the sum of the two lags. For example, take again two complementary products A and B, the first a web development tool the second a complementary end-user application. If there is a lag of 1 month from a web developer adopting product A to putting branded items on a web page and then a 2 month lag for users of product B to exert market pull, then there will be a 3 month lag in the feedback loop. Remembering the critical importance of lag, this will usually (but not always!) mean that the indirect feedback loops are less important than direct feedback loops.

As the interactions get more complicated then more explicit modelling is needed. However, as a rule of thumb, in even the most complex process it is the largest feedback growth factor that has the most significant effect on long term growth. For example, let's focus on the web-developer to web-user interaction and ignore the market-pull interaction. If the growth factor of web developers influencing other web-developers to other web-developers is 2 per month and the rate of web-users influencing other web users is 3 per month. Then the long term growth is determined virtually entirely by the initial web-developers (not their subsequent growth) and has an overall growth factor of 3 (not something a bit bigger). This is a little counter intuitive, but very important. It means that we should (with some caveats) focus our efforts on increasing the vector with the largest growth factor.

reinforcing interactions

The main exception to the 'biggest growth factor wins' rule is when there are two different feedback loops via different vectors. In this case, the overall growth factors add together. This is even better than the whole is the sum of the parts. Suppose we have one mechanism that leads to 2 new users for every user after a lag of one month and a second mechanism that gives rise to 1 new user after a lag of a month. The overall effect of these is that we have 3 new users after a lag of a month. This will lead to a 1000-fold increase every 6 months, whereas the stronger of the two mechanisms would only have achieved this after 10 months.

managing value

If we are simply advertising a product to a target market group, then we must simply ensure that the perceived value to them is large enough to convince them to buy. In the rich ecology of the Internet market this is insufficient. We need to design products whose value enhances multipliers and feedback loops. The lattice of value is an example of this for the web-developer – web-user interaction. Similar issues arise for web-user – web-user interactions. Any form of collaborative product is in danger of requiring a critical mass of users before it starts to take off. Suppose we design a highly functional family communication tool (the shared front room?) that depends on each distributed member of the family having a copy of our software. This is unlikely to achieve growth, as it would require several members of the family to simultaneously decide to download our software. If, in contrast, we produce a simpler tool that can use normal web browsers (but is perhaps more functional for those with a download), we can add value for each user incrementally and hence increase our likelihood of growth and success.

limits to growth

We cannot expect to achieve exponential (or even linear) growth forever.

total market size

This is the obvious limit to growth. For many of our products the eventual market is 'the entire Internet population'. If we approach these limits we will not worry!

cliques

A greater problem is where we saturate some sub-group. For example, if someone tells 10 friends about a product and each of them tells 10 people, it is likely that a lot of these people will overlap. In the worst case everyone in a sub-group will know about us but no-one else!

Of course, if this happens with any group, we can take advantage of it (having a large proportion of any market is a strong position), but we would like to achieve a broader base.

In biological systems this can happen where a group is geographically limited. This happens with fairy rings. Each toadstool spreads in all directions. One toadstool can give rise to many others. For the fist toadstool this happens – and a small ring of child toadstools form. However, for subsequent generations the overlap between the sites is such that only linear new growth occurs (around the circumference of the ring). In contrast, insect pests do multiply at a near exponential rate. This is because they can move rapidly within an area and so avoid geographic limitations (up to a point). Their flights effectively bring distant points of space 'close' together and make physical space more like cyberspace!

The Internet community is more like the insect pest with many 'long hop' friendships and contacts across continents and between sub-groups. So, we certainly would not expect a fairy ring effect. However, there will also be cliques and we should expect that the effective growth rate will be lower than a simple projection would suggest. We can build this in by reducing our estimates accordingly. The exact figures for this are not, to our knowledge, available; however, there is strong evidence that the cross-linkages between cliques are strong enough to allow rapid growth. Several Internet products have already achieved massive growth rates; furthermore, Internet chain letters announcing non-existent viruses (as well as those announcing real ones!) spread extremely rapidly and widely.

retention

Growth will only occur if we keep our users long enough for them to directly or indirectly 'recruit' others. Also many revenue streams depend on the total user group not just new users. So, it is important that we can tie in our users as much as possible. Although purely web-based services are likely to encourage rapid entry, they are also the most vulnerable to fashion shifts and competitors. Encouraging downloads to enhance such services is therefore important in establishing a loyal user base. It also helps reduce the barriers for new desktop-based products.

managing risk

It would appear that the best long-term growth policy would be to find the largest potential feedback growth factor and work to maximise its fecundity and minimise its lag. Although this is largely right, a prudent approach would be to exploit the marketplace ecology more widely. This is partly for the normal reasons to spread risk, but also because of the particular nature of dynamic interactions

sensitivity

The largest feedback growth factor eventually outweighs all other factors. However, the level of growth is very sensitive to the lag and fecundity. Small changes in either of these make very large differences to projections. As estimates of fecundity are likely to be imprecise, especially for new vector products, this may mean that we put our effort into the wrong product.

strong non-exponential growth

Although even weak exponential growth is *eventually* stronger than any linear or cumulative growth effect, this may be after a very long time. Given the rapid changes in Internet technology we need to look at a finite time frame over which strong non-exponential factors may still be the most significant.

Risk spreading by pushing some non-exponential growth factors is particularly useful if the user group being grown is one that is subject to potential exponential growth. If exponential growth takes off to the extent planned then it is being seeded by strong factors, if exponential growth is slower a market is still building.

costs of growth

Exponential growth could lead to exponential costs outstripping revenue. This is a problem with all growth, but being primarily Internet based we are more secure than most businesses.

overall message

With some caveats, to maximise long term growth we must:

- map out the interactions in our marketplace ecology
- identify the major feedback loops and multipliers
- where appropriate create new vector products
- maximise growth factors especially in feedback loops
- minimise lags