

Mobile ecosystems

Money talks

Technology

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Low to zero device growth means that revenue is becoming increasingly critical to the ecosystem. Edison's new monetisation model benchmarks ecosystems that monetise via advertising and subscription and facilitates the comparison with those that monetise through hardware. Although Google has benefited from iOS's recent strength, there are real cracks appearing in its ecosystem that need to be addressed urgently. Elsewhere, Twitter remains gridlocked, while Yahoo fails to execute. Facebook has the most potential.

- **Money talks.** Monetisation has to be the end game for every ecosystem as, without it, there is very little point in getting out of bed. Edison has developed a simple monetisation model that assesses where ecosystems are on this journey, rates their performance and estimates their long-term revenue potential.
- **The first cracks in Google's** armour are appearing. The combination of its increasing dependence on iOS, a weaker position in Digital Life, ongoing problems with software fragmentation/distribution and the growing risk of losing control of Android puts Google on the back foot. Long-term estimates for Android monetisation look to be at risk, raising the potential for a de-rating of the shares.
- **Facebook** continues to show all the signs of developing into an ecosystem, but still has a lot of work to do. Our monetisation model shows there is still some space for revenue growth, but this is likely to run out before everything is in place for the next leg up. The resulting correction is likely to offer an opportunity to get in at a much lower valuation.
- **Twitter** has fully monetised the opportunity open to it and remains in the throes of strategic paralysis. The combination of a part-time CEO and the continuing executive exodus makes it very difficult for a bold new strategy to see the light of day. Until this strategy emerges, growth will be very hard to come by.
- **Yahoo.** We estimate that Yahoo's lack of execution is causing it to miss out on 93% of the mobile opportunity. Most worrying of all is that management appears satisfied with its performance in mobile, implying that it has very little understanding of how the ecosystem can drive revenues.
- **Apple and Microsoft** serve as the do and do not of monetisation via hardware. Apple generates 5-10x the amount of 'ecosystem revenue' via hardware than if it used advertising. By contrast, Microsoft generates no 'ecosystem revenue', raising questions on the viability of its consumer ecosystem.

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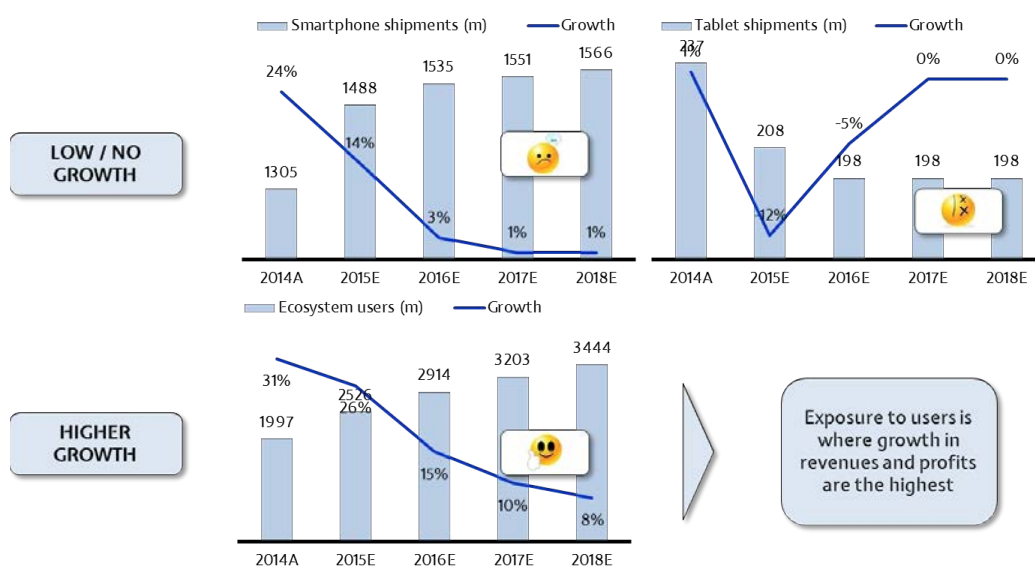
Market update

Smartphones and tablets

The smartphone market's focus is likely to shift more radically in 2016 as growth dips below 10% for the first time (Exhibit 1, left-hand side). This is because volume growth in smartphones has largely been driven by price declines, putting the devices in reach of a much larger number of users. As unit growth declines below 10%, price declines will also likely slow, but the spectre of a declining market in value terms becomes very real.

We currently expect that smartphone volume growth will decline to 3% (1,535m units globally) in 2016, meaning that any significant price erosion will cause the market to decline in value terms. Competition will then rise, increasing the spectre of even greater margin compression in Android. On this basis, we think that 2016 could well see a number of players exit the handset market: HTC and BlackBerry are the most likely candidates. The tablet market is in even worse shape (Exhibit 1, right-hand side). We forecast negative growth for the next two years before stabilising at around 200m units per year. Tablets are being meaningfully eroded by large-screen smartphones, which for many functions obviate the need to carry an extra-large screen device. This, combined with the saturated user base, has hammered shipment growth.

Exhibit 1: Smartphone, tablet and ecosystem forecasts, 2014-18



Source: Edison Investment Research, Counterpoint Research

With hardware growth evaporating, the ecosystem is becoming even more important. There are still plenty of mobile phone users who have still not upgraded to a smartphone, so for the next few years we forecast that 918 million people will buy a smartphone for the first time. These users represent new additions to the ecosystem, which is why growth in users will remain above 10% until 2018. Hence, any monetisation model that relies on users rather than devices is likely to see better growth than device sales. Apple is by far the best at monetising its ecosystem, but the growth of the underlying market on which it depends is likely to substantially underperform user growth (Exhibit 1).

Of the three monetisation methods (Exhibit 2), two (advertising and subscription) are driven by the number of users rather than device sales. Consequently, any ecosystem choosing to monetise through advertising or subscription has a much easier foundation from which to grow when compared to hardware shipments (Exhibit 1).

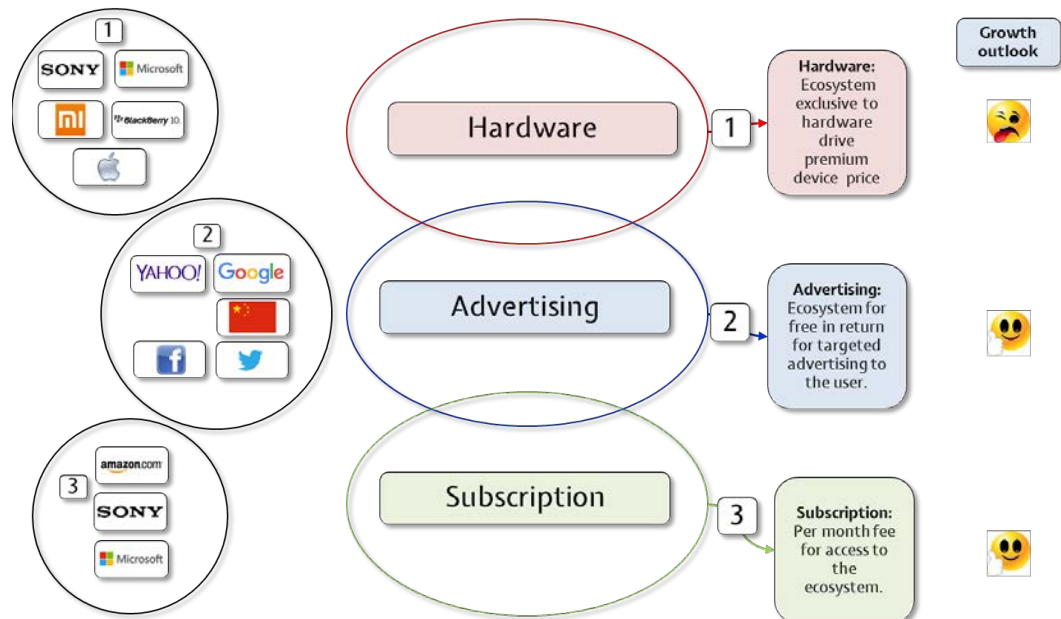
Ecosystems

Monetisation methods

Although often ignored, the ability to monetise is the single most important characteristic of any ecosystem. Monetisation has to be the end goal for every player in this space and our ecosystem measurements of Digital Life and the Seven Laws of Robotics lead directly to an ecosystem's ability to generate revenues for its owners. The focus of this report is to use Digital Life and the Seven Laws of Robotics to estimate the capacity for monetisation in an ecosystem. With hardware this is reasonably straightforward, but with advertising and subscription it is much more difficult. The details of this analysis are on page 3, but first it is important to properly understand the three methods of monetisation (Exhibit 2):

- 1. Monetisation through hardware:** this involves keeping the ecosystem exclusive to devices from a single manufacturer and earning a return on it through premium device pricing. If the ecosystem is desirable, users will be willing to pay a premium to access it. This is exactly what drives Apple's margins and what almost every other device maker is trying to emulate. This method is by far the best for generating absolute levels of revenue, but it is also the most risky. Not only is the growth profile of the end-market now very poor (Exhibit 1), but business can also be very volatile. A device maker only has to misjudge one product cycle for market share and margins to plummet in a matter of months. Hardware has high rewards, but also carries much higher risks.
- 2. Monetisation through advertising:** the ecosystem is effectively given away for free, but monetisation occurs through targeting users for marketing campaigns sold to advertisers. It is a very effective method for the mid- and low-tier players, but requires excellent infrastructure to be effective. On our analysis, a good score on Laws of Robotics 3 and 6 is required to achieve very effective monetisation. It should come as no surprise to see Google get top marks on each of these laws.
- 3. Monetisation through subscription:** here, monetisation is achieved by selling access to the ecosystem for a fixed subscription paid either monthly or annually. It is the least developed of all of the business models, but we can see it becoming more popular as users become fed up with being constantly bombarded by advertising. Axel Springer's recent decision to charge users (who refuse to turn off ad blockers) a fee to access its content is a great example of how this monetisation method is emerging. This model can also sell itself on its security and privacy, as there is no need to track user behaviour or share it with any third parties. Amazon has followed this route with Amazon Prime, but has yet to see real volume. We think that Microsoft could also follow this route by expanding its Xbox Live offering to cover more Digital Life services or by offering Windows 10 on a subscription basis similar to Office 365.

Exhibit 2: Three models of monetisation and growth outlook



Source: Edison Investment Research, Counterpoint Research

Monetisation capacity

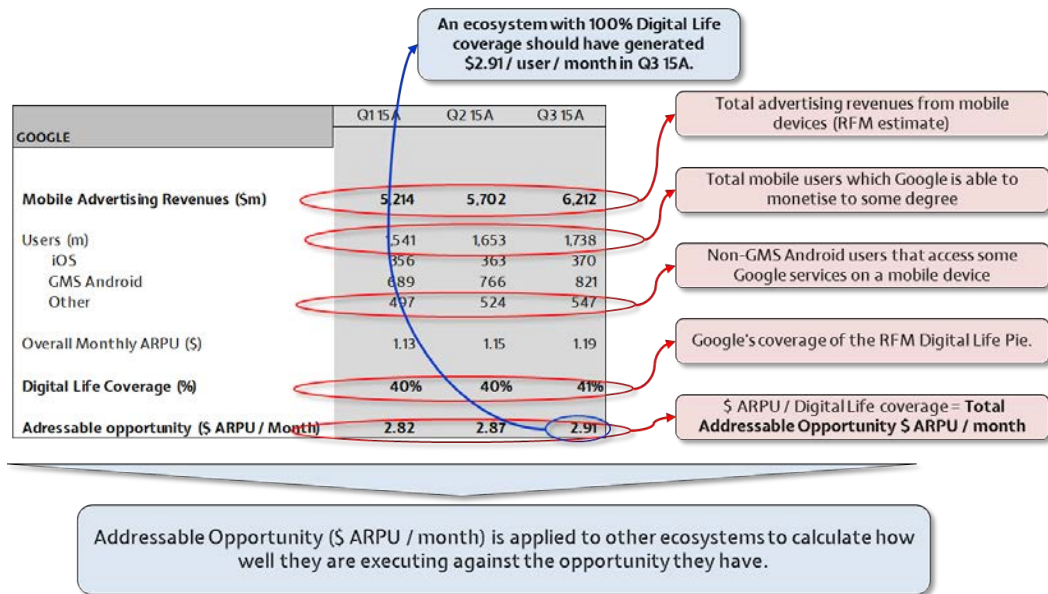
To date, our analysis has not cemented a link between its ecosystem measures and how they correspond directly to revenue generation capacity. We think that as growth slows, monetisation will be thrown into ever sharper relief. Consequently, it is important to be able to evaluate how improving Digital Life and the Seven Laws of Robotics can translate directly into revenues.

This section estimates how well advertising-based ecosystems are monetising their opportunity. It also uses the examples of Microsoft and Apple to compare how monetisation through hardware stacks up against monetisation through advertising. This measure is useful to identify the following:

1. **Potential:** predicting how much potential an ecosystem has for monetisation with its current strategy and Digital Life coverage.
2. **End of the road:** identifying when an ecosystem's rapid growth trajectory starts to slow, typically occurring when actual revenues and predicted revenues are the same.
3. **Failure:** pinpointing ecosystems that are failing to capitalise on the opportunity, using the Seven Laws of Robotics to identify why.
4. **Comparison:** comparing the efficacy of different methods. For example, calculating the revenue potential from advertising and comparing it to actual revenues generated by an ecosystem that employs either the hardware or subscription method.

We have long believed that of all the ecosystems that monetise through advertising or subscription, Google is by far the most mature and best established. We forecast that it will generate \$23.8bn in revenues in 2015. We use Google as the benchmark when sizing the addressable market for monetisation through advertising (Exhibit 3).

Exhibit 3: Derivation of addressable opportunity using Google, Q1-Q315

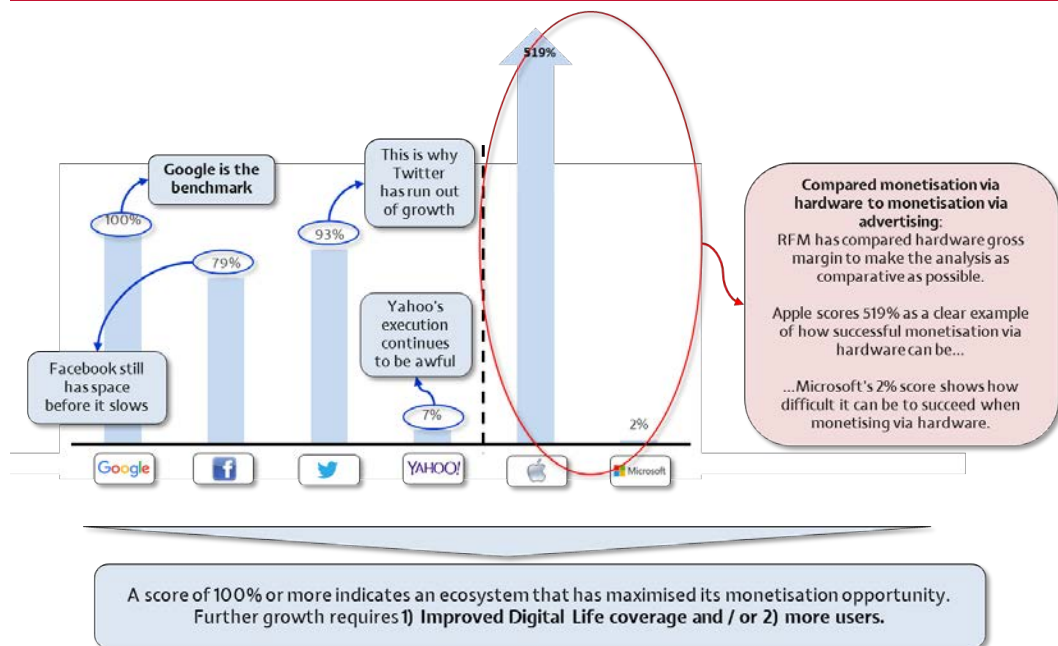


Source: Edison Investment Research, company data, Google

We have been tracking users who access Google services and the revenues they generate for the last two years, which forms the main inputs of its assessment of the addressable market. These estimates are then combined with our assessment of Google's Digital Life coverage to size the addressable market. Exhibit 3 concludes that an ecosystem with 100% coverage of Digital Life and a good score on the Seven Laws of Robotics should have been able to generate \$2.91 per user per month in advertising revenues in Q315. This figure has been arrived at by calculating the average revenue per user (ARPU) Google generated with its 41% coverage of Digital Life (\$1.19) and extrapolating that to 100% coverage.

This figure is then applied to the different ecosystems that monetise through advertising. Based on their Digital Life scores (Exhibit 7) and how many users the ecosystem has, we can calculate the revenue potential of the ecosystem in any one quarter. This is then compared to actual revenues generated and expressed as a percentage to ascertain how well the ecosystem is performing (Exhibit 4). Analysis of how well the ecosystem performs against the Seven Laws of Robotics (Exhibits 8 and 9) aids in determining the quality of execution and the reasons (1-4 above) why the actual revenue differs from the calculated figure.

Exhibit 4: How well ecosystems monetise relative to the benchmark, Q315



Source: Edison Investment Research, company data, Google

This analysis (Exhibit 4) explains why Twitter's growth has ground to a halt and why Facebook can continue to grow despite the fact that its revenues are already eight times greater than Twitter's. It also throws into sharp relief how badly Yahoo is delivering on its mobile opportunity, which in turn highlights the company's severe problem with strategy and execution.

We have also compared the monetisation of Apple and Microsoft to what we would expect them to generate if they were using monetisation via advertising. To make the figures as useful as possible, we have used device gross margin instead of revenue to estimate the value derived from the ecosystem. We think this is a better measure of ecosystem monetisation by hardware, as many companies that sell hardware (but have no ecosystem) can still realise substantial sales from hardware. This analysis clearly illustrates the fact that hardware is by far the best method of monetisation as long as the product remains highly desirable. It also clearly highlights the inherent risks and volatility. Apple is monetising its ecosystem 5-10x better than if it used the advertising model, while Microsoft is currently monetising none of its advertising potential through selling hardware. The findings of this analysis are discussed in more detail in the sections dedicated to each of the relevant ecosystems.

From this analysis we conclude that:

5. there is still scope for Facebook to experience rapid growth, although at its current rate this is likely be exhausted during 2016;
6. Twitter must restart user growth or expand its coverage of the Edison Digital Life pie for revenues to begin growing again;
7. Yahoo is missing out on 93% of the revenues that would be available to it if it were to properly execute an ecosystem strategy on its current assets and users;
8. Apple's hardware monetisation strategy is extremely successful and remains by far its best option as long as its devices remain desirable to the consumer; and
9. Microsoft is failing to monetise its consumer ecosystem, leaving the company with some tough choices to make.

This analysis has the following caveats:

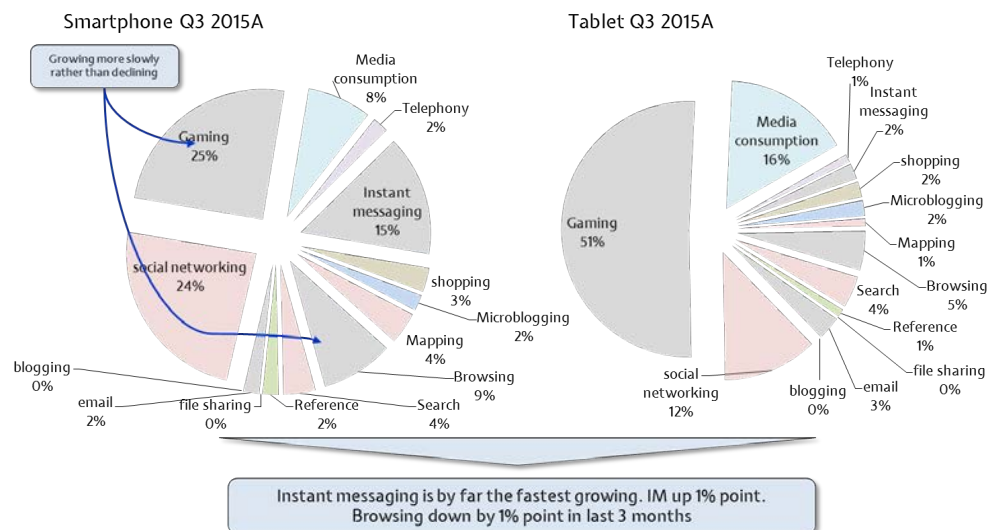
1. It assumes that all segments of the Digital Life pie carry the same potential for monetisation. Today this is not the case, as Google has a number of different ecosystem services that are almost entirely monetised through search. We think this will change with time as monetisation becomes more sophisticated, but for the moment it remains a weakness of this method.
2. It makes no adjustment for seasonality. Advertisers typically increase spending in Q4 to take advantage of the holiday season and dial it back again in Q1. Consequently, this analysis tends to understate the addressable market in Q4 and overstate it in Q1. We currently look at this metric over seven quarters to negate the impact of this problem.
3. Some ecosystems predominantly exist in a single segment or geography of the market, while the analysis uses averages derived from all segments and all geographies. Hence this will cause some inaccuracies in estimating the potential revenue opportunity.

Digital Life

The Edison Digital Life pie (Exhibits 5 and 6) remains central to its analysis of the digital ecosystem. It measures how much time users spend engaged with digital services on their devices (we exclude voice, text and e-commerce). Analysing each ecosystem on this basis gives a very good idea about how well developed the strategy is and how much more work or investment is needed to assemble the right assets to provide a complete offering for the user's Digital Life. It also gives a good assessment of how big the monetisation opportunity is. We have long believed that the total addressable opportunity is directly related to how well the activities in an ecosystem are covered. An assessment of the impact of Digital Life on the monetisation opportunity is discussed in detail on

Digital Life services grow at different speeds, which is why the last few quarters have seen some changes in the make-up of the Digital Life pie. The segments that have lost share are not declining. They are simply growing more slowly than the others (Exhibit 5).

Exhibit 5: Edison Digital Life pies, Q315



Source: Edison Investment Research, Nielsen, Google, Pewinternert.org, CommScore, NetMarketShare

Instant messaging (IM) remains by far the fastest growing segment. The last few years have seen an exponential growth due to the high level of smartphone penetration. Furthermore, the ease of joining and using one of the many networks available has also increased markedly. IM delivers a service superior to SMS and delivers everything that MMS promised but failed to deliver. Furthermore, it does all these things at virtually zero cost to the user. The result is that IM now makes up 15% of the overall pie, which has increased by 1pp in the last four months.

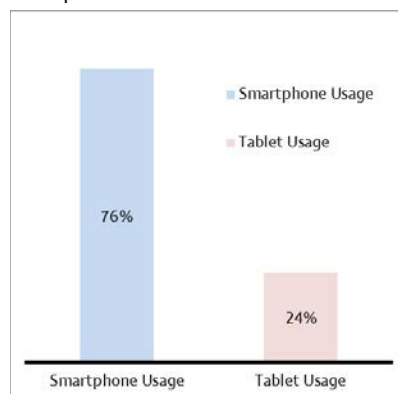
The greater ease and security with which goods can be purchased via mobile devices has also led to the shopping segment growing faster than overall usage. This segment excludes wireless-based payments and reflects Android's poor reputation for security, as well as its overall poor user experience. We expect this segment to continue growing as shopping via a mobile device becomes easier. China is an excellent example of what is possible. A large majority of Alibaba's Chinese transactions are already being settled over a mobile device. Despite the advanced state of the Chinese e-commerce on mobile market, the time spent shopping on a mobile device is still quite low in China compared with other activities such as social networking, IM and gaming. This indicates that researching and deciding what product to buy occurs on other platforms or in a store, with only the execution of the transaction occurring on the device.

Our Digital Life analysis continues to exclude e-commerce, as the analysis aims to measure the incremental monetisation opportunity afforded by mobile internet. We think that commerce on mobile represents transactions that would still occur even if they were not possible on a mobile device. Therefore, we do not see revenues and profits generated by mobile shopping as incremental and continue to exclude them from this analysis.

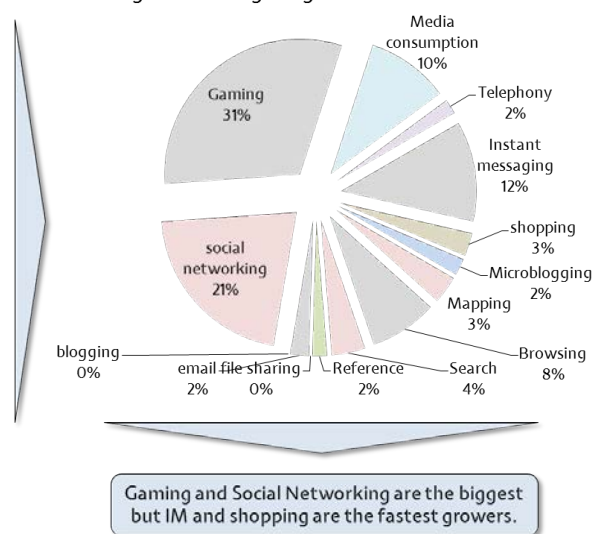
Most ecosystems are still predominantly accessed via tablets and smartphones. Other devices such as PCs, TVs, household appliances and the automobile have yet to register significant usage of Digital Life services, which means their contribution to the user's choice of which ecosystem to use is still negligible. Hence, we continue to focus on the smartphone and the tablet as the dominant devices in determining user choice. We amalgamate the usage patterns on the two devices to arrive at a weighted average penetration of the Digital Life pie (Exhibit 6).

Exhibit 6: Weighted average Edison Digital Life pies, Q315

Smartphone vs. tablets % total time used



Weighted average Digital Life Pie

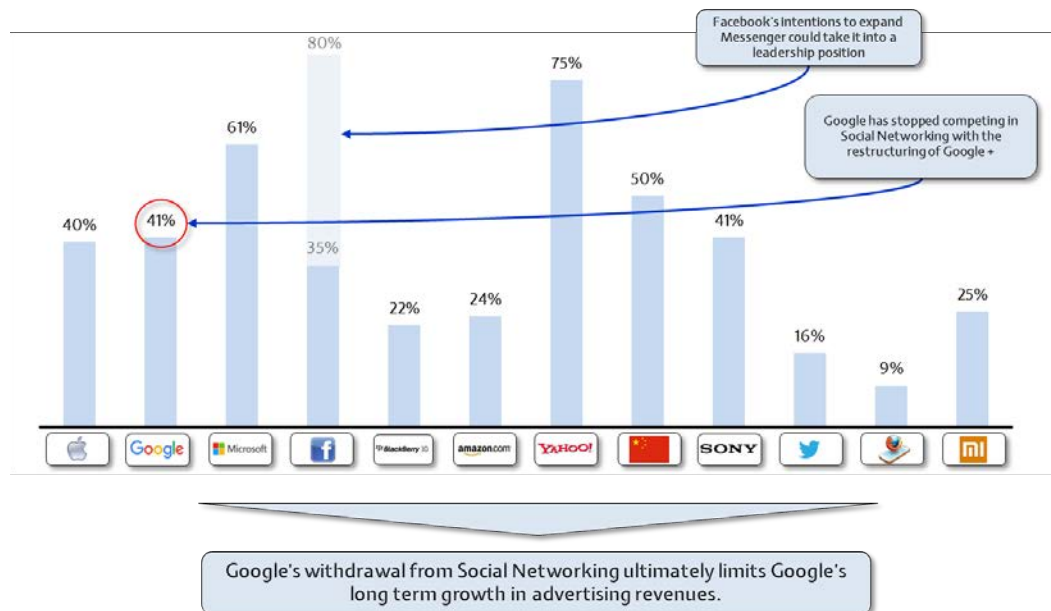


Source: Edison Investment Research, Nielsen, Google, Pewinternert.org, CommScore, NetMarketShare

When the different ecosystems were reassessed for coverage of Digital Life services, there was one major change, with Google ceasing to compete in the social networking segment. There is no doubt that Google's offering here, Google+, has been a huge disappointment and despite substantial investment has failed to gain meaningful traction. We opine that the restructuring of Google+ is an admission that Facebook, Twitter, Snapchat, etc have won the social networking space, requiring Google+ to become something different. Consequently, we have reclassified Google+ as content discovery and moved it into the browsing, media consumption and blogging segments of the Edison Digital Life pie. The result is that Google's coverage falls from 61% to 41% (Exhibit 7) and this decline has significant ramifications when sizing the monetisation opportunity, given that Google has been used as the benchmark. However, we believe that the traction of

Google+ was so low that its contribution to Google's ability to monetise Digital Life was negligible. Therefore, including Google+ as a 21% contributor of the addressable monetisation opportunity was clearly erroneous.

Exhibit 7: Edison coverage of Digital Life by mobile ecosystem Q315



Source: Edison Investment Research

The Seven Laws of Robotics

While the Digital Life analysis assesses ecosystems on the degree to which they are addressing the opportunity, it makes no assessment of how well they do. This is where the Seven Laws of Robotics come in. These are seven simple tests that appraise the quality of the ecosystem and how likely it is to succeed. Combined with the Digital Life pie, these laws form the basis of the estimates that we make with regard to users, revenue, profit generation and the value of any one ecosystem.

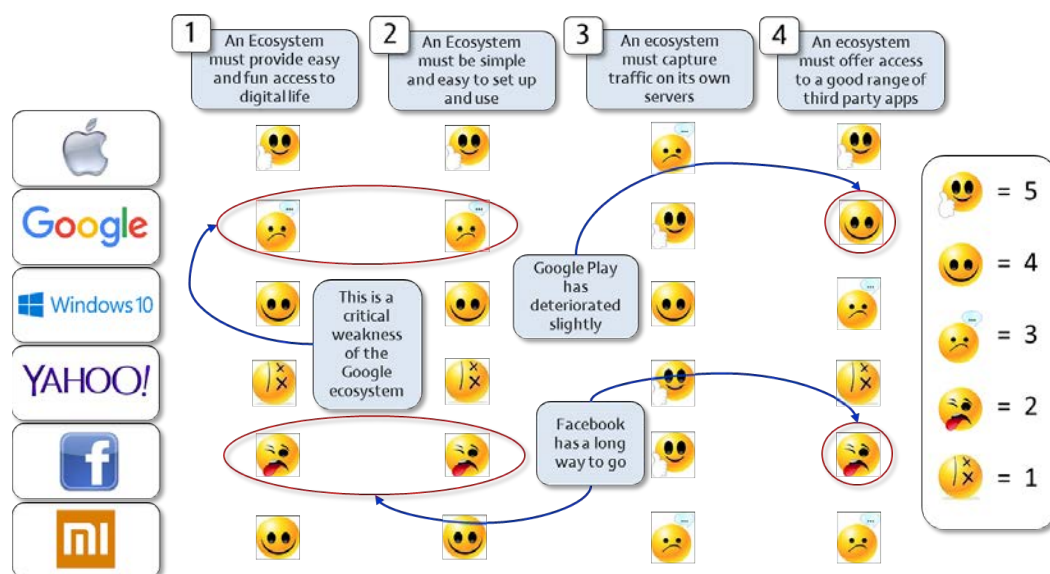
The seven laws are divided into two groups. The first four are the fundamental assessment of how well an ecosystem caters to the requirements of its users and a major determinate of its ultimate success in generating a return for its stakeholders. Laws 1 to 4 are:

- 1. Easy and fun:** an ecosystem must provide easy and fun access to Digital Life.
- 2. Set up:** an ecosystem must be simple and easy to set up and use.
- 3. Traffic capture:** an ecosystem must capture traffic on its own servers.
- 4. App equivalency:** an ecosystem must offer access to a good range of third-party apps.

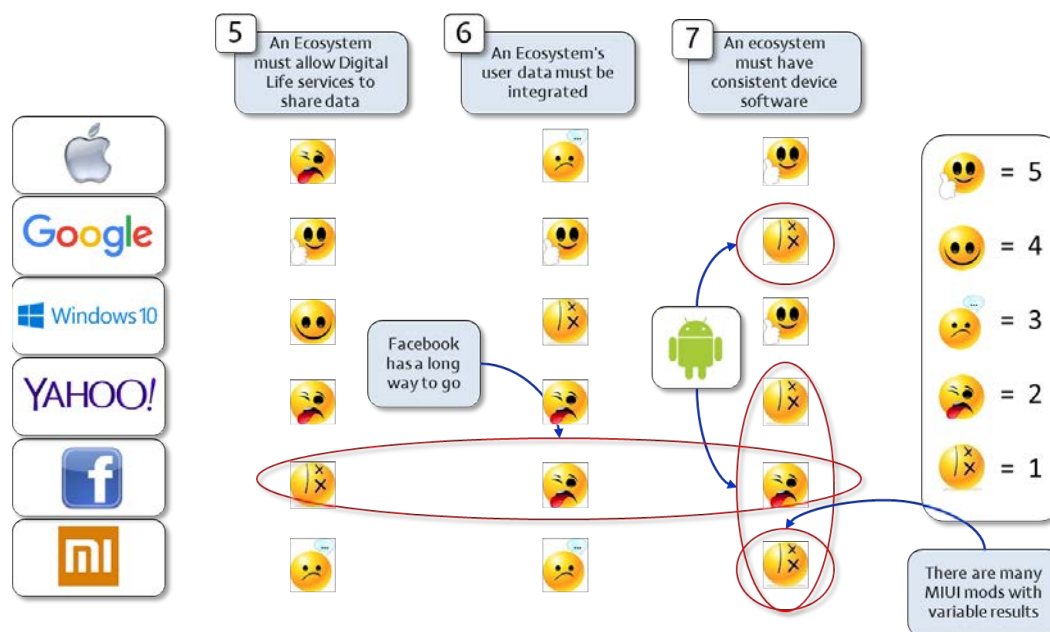
The final three laws are an assessment of how well an ecosystem is set up to compete in the longer term. These are more subtle and assess the internal systems of the ecosystem to ascertain how well it can improve its services and make what it offers deeper and richer for the user. We argue that a good score on laws 5 to 7 is required to be able to fend off the increasing competition that will inevitably materialise as the growth in user numbers begins to stabilise (Exhibit 1). Laws 5 to 7 are:

- 5. Data sharing:** an ecosystem must allow Digital Life services to share data.
- 6. Data integration:** an ecosystem's user data must be integrated.
- 7. Software consistency:** an ecosystem must have consistent device software.

Our assessment of the top six ecosystems against the Seven Laws of Robotics can be found in Exhibits 8 and 9.

Exhibit 8: Laws of Robotics 1-4 for the top six ecosystems


Source: Edison Investment Research

Exhibit 9: Laws of Robotics 5-7 for the top six ecosystems


Source: Edison Investment Research

We have made a few changes this quarter to its assessment of the top six ecosystems, reflecting both changes in strategy and changes in performance and outlook. These are:

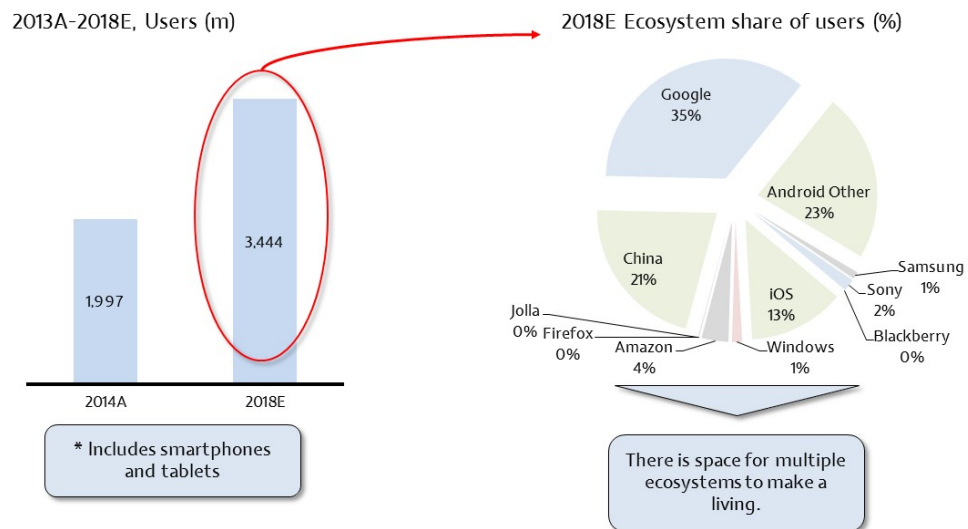
1. The lack of progress and strategy at Yahoo has caused us to downgrade our assessment of the company against laws 1, 2 and 4. We think it very unlikely that Yahoo has the management strength and cohesion to make the most of its assets in the mobile arena.
2. Facebook's strategy has been slightly upgraded against law 4 due to its intention to offer third-party games via its messenger app.

The net result is that there is little change in how well the top six ecosystems fare against the seven laws other than a further downgrade for Yahoo, which more accurately reflects its inability to monetise 93% of the opportunity open to it (Exhibit 4).

Ecosystem status quo

Performance against the Edison Digital Life pie and the Seven Laws of Robotics is used in combination with device shipment forecasts to estimate the size of the ecosystems. We believe that the size of an ecosystem is the single most important measure of how much value it can create for its owner. Furthermore, the relationship between size and value is non-linear. Ecosystems are networks and so their potential to create value conforms to Metcalfe's law of networking, which states that the value of a network is proportional to the square of the number of connected users of the system. Consequently, it comes as no surprise that the ecosystems that make all the profit are also the largest (Exhibit 9). We calculate the current size of all the ecosystems and forecasts how they will evolve over the next three to five years.

Exhibit 10: Ecosystem users by ecosystem provider

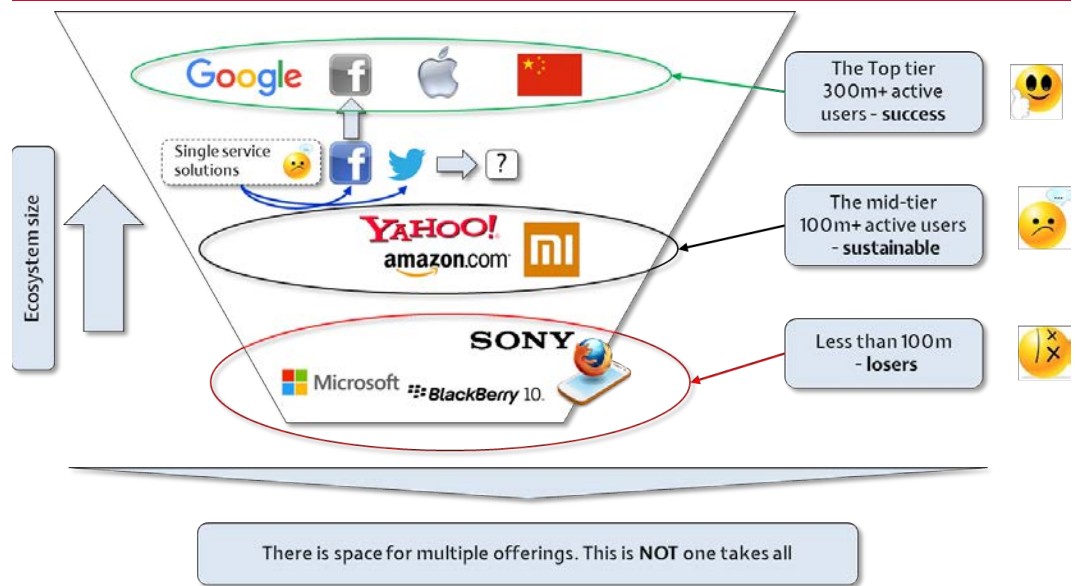


Source: Edison Investment Research, Counterpoint Research

Despite slowing device sales, there is still plenty of growth available in ecosystem membership and usage. We view Android as an OS on which ecosystems are built rather than an ecosystem in its own right, which is why the market is much more fragmented than one would at first think (Exhibit 10, right-hand side).

We continue to believe that at least 100 million users are required for an ecosystem to be viable and 300 million or more to make a good return on investment. Using these criteria, there is enough space, in theory, for three to four ecosystems to survive. In practice, there are likely to be five to seven successful, profitable ecosystems with 300m+, several with 100m+ and large groups vying to make it into the big league.

Exhibit 11: Ecosystem users by provider, 2018e



Source: Edison Investment Research

It remains very unlikely that one ecosystem will dominate. iOS caters for the high end, while Google is much stronger in the mid-tier in developed markets. China is a market likely to be dominated by local companies and the opportunity there is big enough for three to succeed without having to look overseas.

Google

The first cracks

The first cracks in Google's armour are beginning to appear, which we believe threaten its long-term outlook. These threats are:

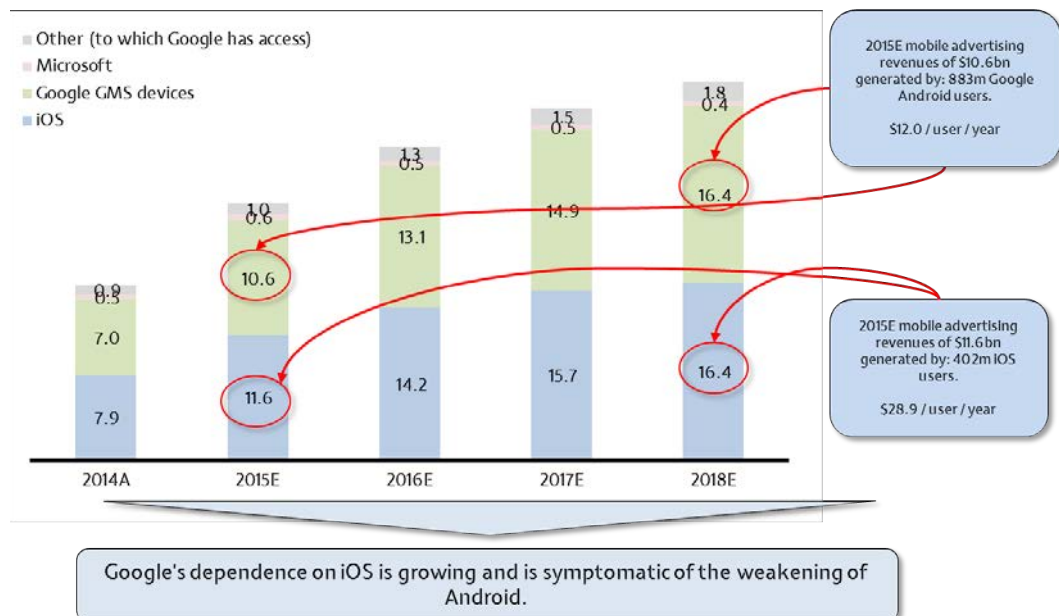
1. **Increasing dependence on iOS:** the share of iOS in Google's mobile advertising revenue mix is growing (see below).
2. **Digital Life:** Google's coverage of Digital Life now looks much weaker, reducing its ability to grow advertising revenues.
3. **User experience:** Google's user experience continues to be hampered by the fragmentation of Android.
4. **Software distribution:** Google remains unable to distribute the updates it makes to Android.
5. **Google Play:** developers are more inclined to develop for iOS compared with Google Play.

Google needs to address issues 2-5 if our long-term expectations are to be met.

Increasing dependence on iOS

Despite the fact that the short-term outlook for its ecosystem is reasonably rosy, Google is beset with a host of problems that threaten its long-term growth. Ironically, in the short term, market share loss by Android to iOS has helped Google as it can earn twice as much from iOS than from the same user on Android. We think that this is the main reason why Google's mobile advertising revenues have been stronger than expected over the last six months. This effect has been strong enough for us to increase our 2016 revenue forecast for Google's ecosystem from iOS devices by 16% to \$14.2bn (Exhibit 12) from \$12.2bn six months ago. It has also increased its 2017 forecast by 21% to \$15.7bn from \$12.9bn in the same time frame.

Exhibit 12: Google mobile advertising revenues per ecosystem, \$bn



Source: Edison Investment Research, eMarketer

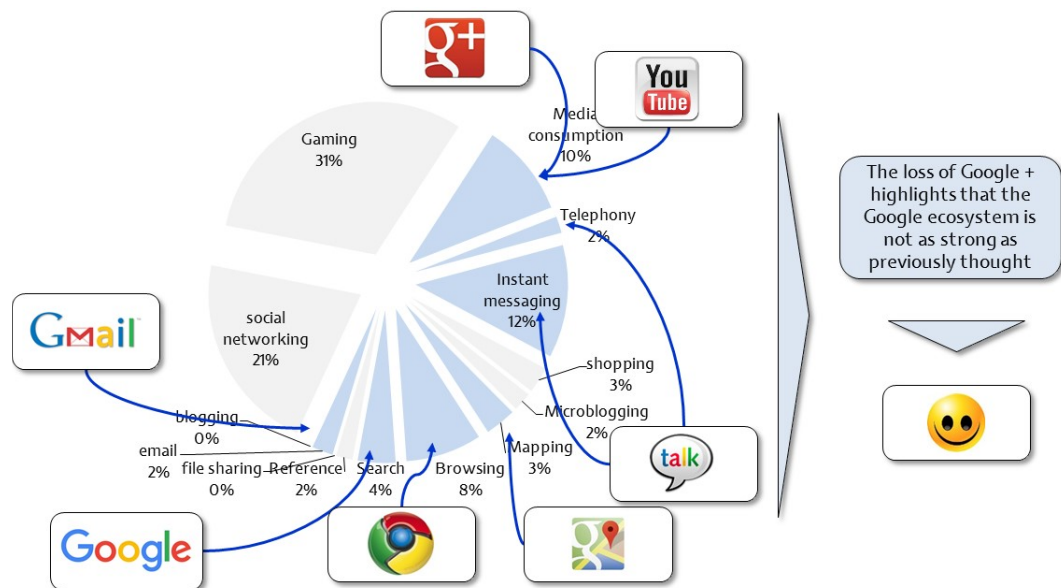
This is good news in the short term, but it increases Google's dependence on Apple as there is always the risk of losing access to its users. We remain convinced that if Apple could remove Google from its ecosystem without upsetting its users, it would do so. Furthermore, Apple is actively working to reduce the ability of third parties to monetise its ecosystem through advertising, further

increasing the necessity for Google to reduce its dependence on iOS and to improve Android. To do this, Google must take control of Android, but progress in this direction has been slow. Without controlling the software and its distribution, it will be impossible to fix the serious shortcomings that hamper the user experience on Android (Exhibit 13). This scenario, combined with the other signs of weakness that are appearing in the Google ecosystem, puts our medium-term forecasts for Google's monetisation of Android at risk. We think that its revenue, profit and valuation forecasts could prove to be overly optimistic unless Google can bring the situation under control.

Digital Life

With the loss of Google+ (Exhibit 13), Google's ecosystem now looks much less complete. Although this does not hamper the company's ability to monetise its ecosystem in the short term, it has negative implications for long-term growth. The adoption of Google+ has been very low, which has resulted in a negligible contribution to the data gathering that allows Google to monetise its services. In the long term this is more of a problem, as social networking and gaming are the two biggest segments of the Digital Life pie and offer an opportunity for growth if Google addresses them properly. The restructuring of Google+ implies that this has proved to be much more difficult than previously envisaged.

Exhibit 13: Google's position in Digital Life



Source: Edison Investment Research, Nielsen, Google, Pewinternert.org, CommScore, NetMarketShare

There is no doubt that Google+ has been a huge disappointment and, despite substantial investment, it has failed to gain any meaningful traction with users. Google can claim hundreds of millions of users due to the integrated nature of its services, but when one looks at usage of Google+ there is very little happening on the service. Without usage there is no real scope for monetisation, which is what has led to the need to restructure.

The admission that Facebook, Twitter, Snapchat, etc have won the social networking space means that Google+ needs to offer something different or be closed down. The new focus of Google+ is defined as collections and communities.

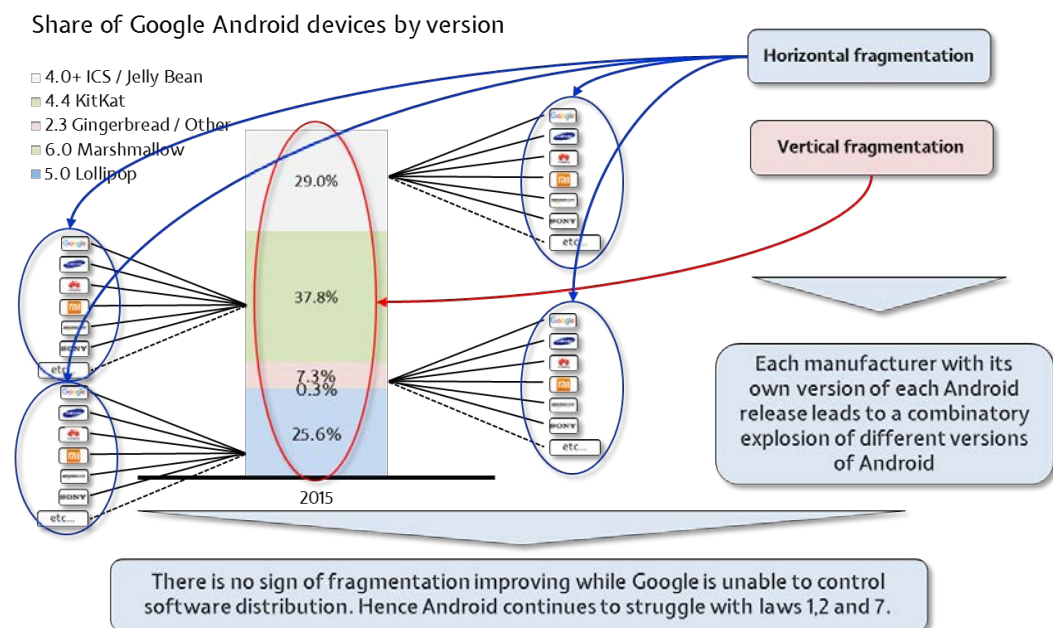
- **Collections:** groups users' posts around different types of interest that other users can choose to follow.
- **Communities:** similar to collections except that it encourages more active discussion of the various topics and interests on which the community is based. Users belong to a community rather than follow it.

With this change, it is clear that Google is moving to focus on the much softer target of content discovery and online discussions. Hence, instead of competition with Facebook, Google is now going after the likes of Reddit, Medium, Pinterest, Tumblr and Twitter. This means that Google's position in Digital Life now looks substantially weaker, as it is no longer competing in the very important social networking space. Consequently, its Digital Life score has fallen to 41% in Q315 from 63% in Q215 (Exhibit 7). Combine this with Google's absence in gaming and suddenly its ecosystem looks much weaker in the long term. This is the first of several long-term problems for Google.

User experience

While the user experience in the Google apps is good, the overall user experience as defined by Android remains poor (Exhibit 13). The user experience in an ecosystem is made up of both the Digital Life services and how they are presented to the user. This presentation on Android is where the problems begin. They are primarily caused by the ongoing and endemic fragmentation of the Android software (Exhibit 14). Vertical fragmentation refers to the fact that there are multiple versions of Android in the market in volume at any one time. Horizontal fragmentation refers to the fact that each handset maker makes modifications to the software for its own uses.

Exhibit 14: Vertical and horizontal fragmentation of Android



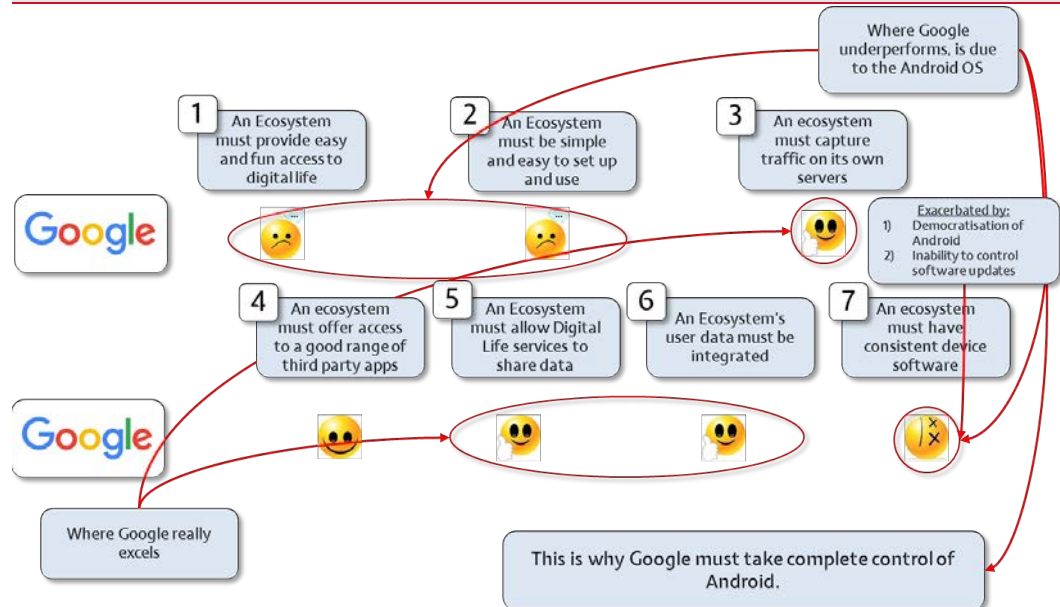
Source: Edison Investment Research, developer.android.com

The end result has been an explosion in the number of different versions of Android in the Google ecosystem. If this is expanded to include all the non-Google ecosystem devices, the number of different versions quickly reaches thousands. This has substantial and negative implications for the user experience, as consistent software is one of the foundations of an easy and fun to use ecosystem (Exhibit 13). We think that the outlook to improve this fragmentation is poor because of Google's inability to update devices that run Android (Exhibit 14).

The net result is that Google's ecosystem has consistently scored badly on three of the Seven Laws of Robotics (Exhibit 13). Unfortunately, Google struggles with the three laws that are most important in terms of defining the quality of the user experience. The result is that the user experience of the Google ecosystem on Android is greatly inferior to that on iOS and, ultimately, is why users exhibit much lower loyalty. Low loyalty also increases the risk of defection if something better comes along. In the high end this has resulted in defections to iOS, but Android is fortunate

that in the mass market a credible alternative has yet to appear. Lower usage also partly explains why an Android device generates less than half of the advertising revenue (Exhibit 10) than an iOS device. Demographics are also a factor, but we have long believed that shortcomings in the user experience have had the biggest effect.

Exhibit 15: Analysis of the Google ecosystem vs the Seven Laws of Robotics

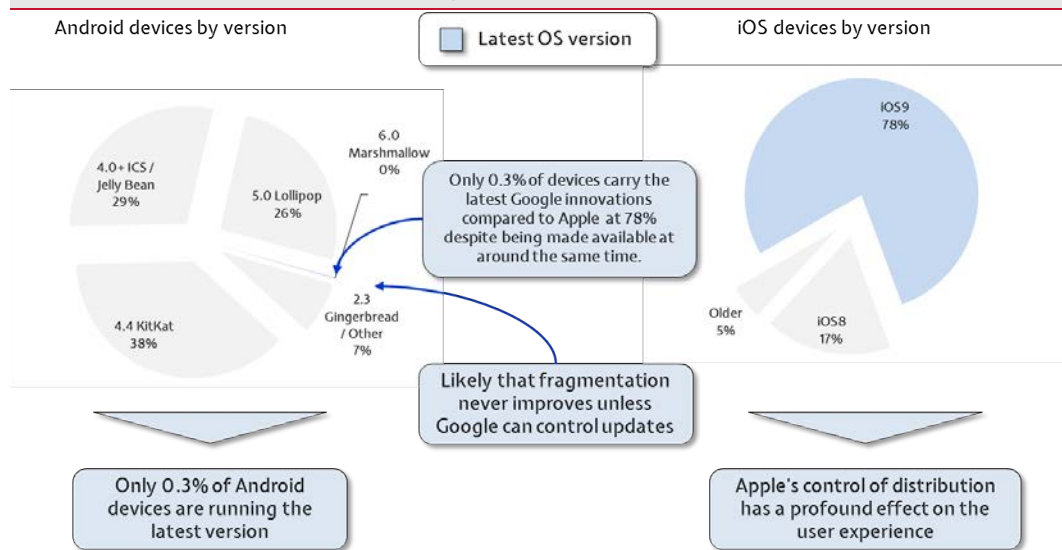


Source: Edison Investment Research

Software distribution

Google's inability to distribute its own software remains one of the most serious problems that the company faces. This problem exists because of the open source nature of the Android software. This has meant that handset makers, device makers and mobile operators can upgrade the devices they make or those that are on their networks whenever they want. Device makers are not incentivised to upgrade existing devices because it makes users less inclined to replace an old device with a new one. This problem is so acute that new versions of Android are effectively only installed on new devices, with the existing user base remaining largely untouched. Currently, 78% of iOS devices are running the latest version compared to just 0.3% of Google-compliant Android devices (Exhibit 16). This is despite the updated software being made available at around the same time. It means Google's innovations, which would naturally make its ecosystem more appealing to users, are unavailable to the vast majority for a significant period of time.

Exhibit 16: Android and iOS devices by OS version, Sept 2015



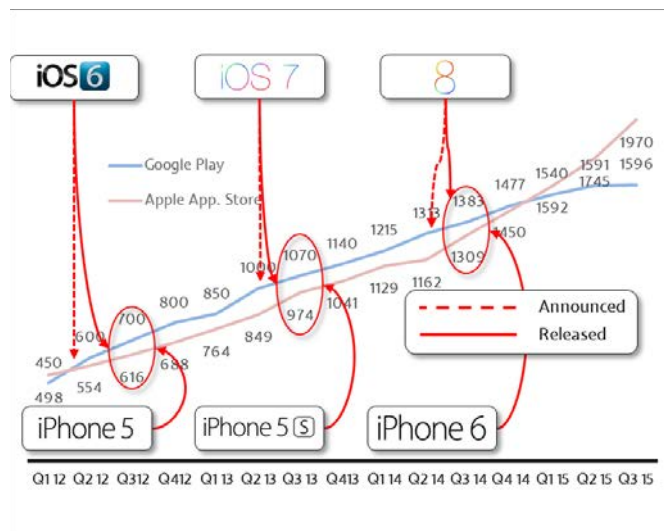
Source: developer.android.com, Mixpanel, Edison Investment Research

This is a boon for all of Google's competitors, which effectively have a two-year window to implement any of Google's innovations and get them to the market before it can get the original into the hands of its users. In short, Google's R&D is benefiting the competition. Without fixing this issue, none of its efforts to improve the user experience will matter.

Without the ability to distribute its software, all the improvements that it makes to the user experience to fix its shortcomings will remain on the shelf. It is worth noting that this is only true for changes and upgrades that are made to AOSP. For GMS, Google can upgrade the individual services at any time simply by posting an updated app to Google Play or the Apple App Store. Consequently, it is only the features that are still in AOSP that suffer from this problem. However, any Google app that requires modifications in AOSP to function will also fall foul of the software distribution problem. Hence, many of the improvements that Google wishes to make to its services require upgrades to the underlying AOSP to function. Now on Tap is a great example of a great service that has huge potential benefit to Google, but requires Android M to function. We estimate that it will be 2017/18 before Android M is in the hands of the vast majority of Android users.

Google Play

Until Q315, there were only two real contenders for the distribution of third-party apps: the Apple App Store and Google Play. Eighteen months ago, virtually everything that was available in the Apple App Store would be made available at the same time on Google Play. Although the user's spend on Android devices was half that of iOS, the addressable market was far larger, meaning that developing for Android could generate as much money for a developer as iOS. At the same time, Samsung was still enjoying strength in the high end and had a vast share of the Android devices that were in the hands of users. This meant that a developer could write for a Samsung device and not worry too much about the rest as the majority of the monetisation opportunity was covered in one shot.

Exhibit 17: Available apps vs iOS/iPhone availability, Q112-Q315


The iPhone 6 and iOS 8/9 have had an enormous impact on 3rd party app developers.

Android losing out as:
 1) Developers follow the money
 2) Poor software consistency and Samsung's decline

This is one reason why Android ARPU is declining and iOS ARPU is rising

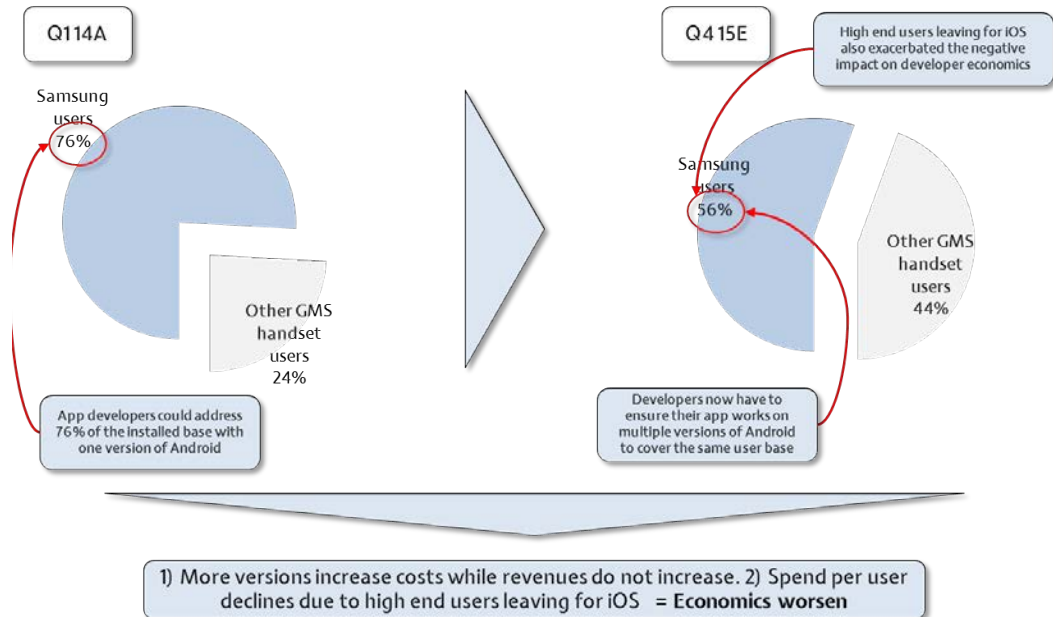
Source: AppBrain, 148apps.biz, App Annie, Edison Investment Research

However, fast-forward to today and a completely different picture emerges. The combination of the desirability of the iPhone 6 and a levelling of the Android playing field has meant that the economics are no longer as good for an Android developer. This is why we believe that the Apple App Store is beginning to pull away from Google Play (Exhibit 15) and why the other app stores are showing signs of catching up with Google Play (Exhibit 17).

We have observed two shifts in the market that negatively affect developer economics on Google Android:

1. The popularity of the iPhone 6 has ensured that Android has lost a significant number of high-end users to iOS. Google's own numbers indicate this to be the case, as its revenue performance from the iOS ecosystem (Exhibit 10) has improved over the last 12 months, underpinning solid results in both Q2 and Q315. High-end users spend more than low-end users and so the total revenue opportunity for developers on Android is not as attractive as it was just 12 months ago.
2. There has been a significant democratisation of market share when it comes to Android users. In its heyday, 76% of all GMS users were using a Samsung device and, if Samsung's market share had not fallen, that number would have been nearly 90% by the end of 2014 (see *Samsung and Google – Gorilla War*, 3 June 2014). However, with Samsung's market share losses, we calculate that only 56% of GMS users will be using a Samsung device in Q415 (Exhibit 16). This creates problems for developers as each handset maker makes modifications to Android (Exhibit 12) that require extra testing and sometimes rewriting on the part of the developer to ensure that the app works properly on handsets from different vendors. In late 2013 and early 2014 life was much easier, as a developer could cover 76% of the installed base with just one version. Now one version only covers 56% of the installed base, which means greater investment is required on the part of the developer just to maintain the same coverage of GMS devices. Higher investments and flat revenues substantially weaken the case for developing for Google Android.

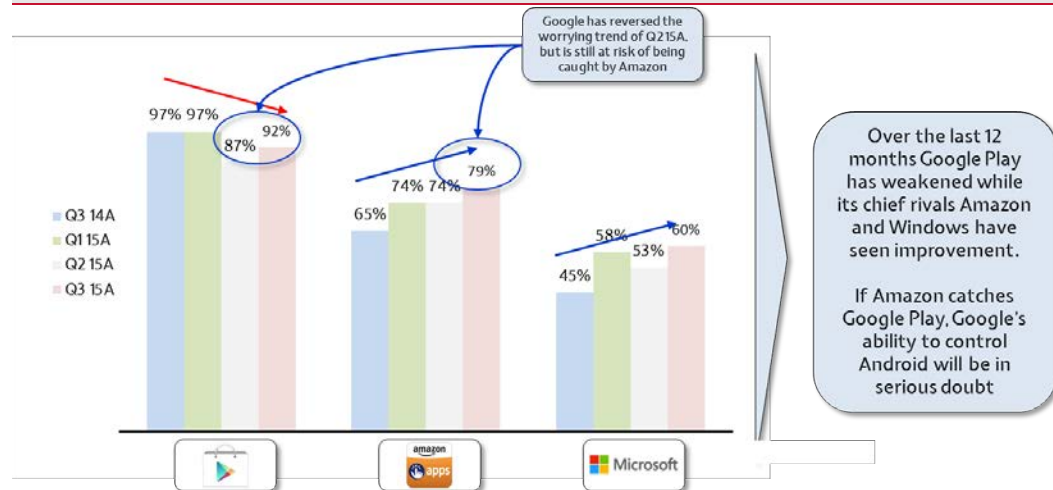
Exhibit 18: The worsening developer economics of Google Android



Source: Edison Investment Research, Counterpoint Research

The end result of these two events has been that developers have changed their priorities. Instead of developing for iOS and Android together, we now see developers developing for iOS first and then moving to Android as and when necessary. This is why the total app count continues to move in iOS's favour (Exhibit 15) and why Google Play's ability to emulate the Apple App Store has also taken a hit (Exhibit 17).

Exhibit 19: Competing app stores vs Apple App Store time series, Q314-Q315



Source: Edison Investment Research, Apple, Amazon, Google, Microsoft, App Annie

At the same time that Google experienced declines in the strength of Google Play, both Amazon and Microsoft have seen an improvement. While Microsoft still remains very far from being able to replicate the required app store experience, Amazon is closing the gap. In Q314, 32pp separated Google Play from Amazon on our measure, but by Q315 this gap had closed to 13pp (Exhibit 17). We therefore consider it essential that Google Play maintains a significantly better experience than Amazon. Put bluntly, Google controls Android through Google Play. Without this control, it will no longer be able to put its ecosystem front and centre on Google Android devices, which would result in falling engagement and lower revenues. In this scenario, it is clear that our forecasts for Google's advertising revenues from Android would be too high.

Handset makers and operators in developed markets must have Google Play on their devices to keep users happy and this demand has allowed Google to control how its services are deployed on devices that it does not make. If Google Play becomes no better than the Amazon App Store, handset makers and operators will be able to offer their users just as good an experience without having to meet Google's demands. This would materially damage Google's revenue generation capability as well as its ability to fix both the user experience (Exhibit 13) and software distribution (Exhibit 16).

This is why Google must ensure that Google Play remains superior to Amazon because only then will it still be able to control Android. Control is critical to its ability to generate growth in Android revenues in the medium term.

Monetisation benchmark

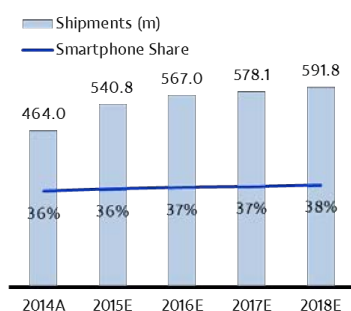
Although Google faces challenges to its ecosystem in the medium term, it remains the gold standard in terms of generating revenue using advertising (see Exhibit 2). This is because it has been developing its business for more than 10 years, has the most advanced and efficient monetisation systems and generates far more advertising revenue from mobile devices than any of its competitors. Just as we judge the Apple App Store as the benchmark for the provision and distribution of third-party apps, we use Google as benchmark for monetisation via advertising. It is on this basis that we have calculated that an ecosystem with 100% Digital Life coverage and a good score on the Seven Laws of Robotics should be able to generate around \$2.91 per user per month through advertising (Exhibit 3).

This figure changes every quarter in line with the number of members of the Google ecosystem and the amount of revenues that Google has generated. The result can then be applied to the other ecosystems by adjusting the expected ARPU relative to its Digital Life coverage to work out the total amount of advertising revenue that its ecosystem should be generating at any one point in time, taking into account current market conditions.

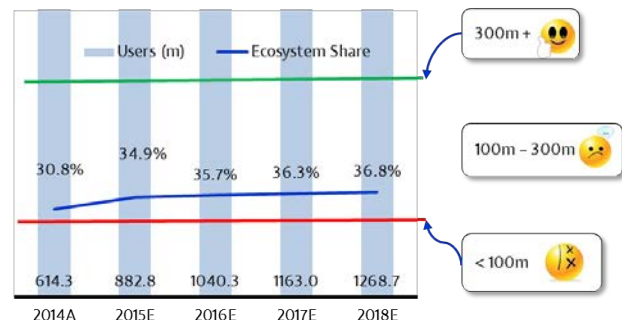
This analysis has been applied to all the ecosystems that use advertising as the prime method of monetisation to assess how well they are faring relative to their potential. It has also been applied to Apple and Microsoft to demonstrate both the advantages and the pitfalls of monetisation through hardware.

Exhibit 20: Forecasts for the Google ecosystem. 2014-18

Google Android phone unit shipments and share



Google Android users and ecosystem share



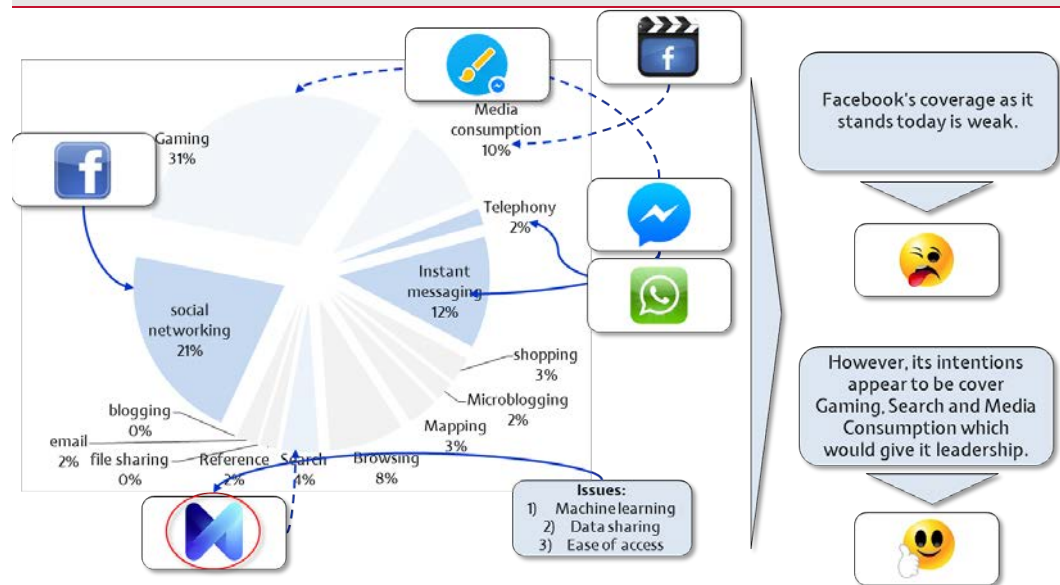
Google's needs to assert control over its ecosystem in order to be sure of holding share

Source: Edison Investment Research, Counterpoint Research

Facebook

We believe that Facebook remains the ecosystem with the most potential. As of today it exists as two separate services (social networking and instant messaging), but it is doing an excellent job at monetising the assets that it has (Exhibit 21). However, the conundrum the company faces is that it will soon run out of growth as it is close to fully monetising the opportunity it has in its current form. The options to continue rapid growth are either to expand the user base, which will be tricky given its enormous size, or to expand the areas of Digital Life that it covers. We think that growing Digital Life coverage remains its best opportunity.

Exhibit 21: Facebook's position in Digital Life



Source: Edison Investment Research, Nielsen, Google, Pewinternert.org, CommScore, NetMarketShare

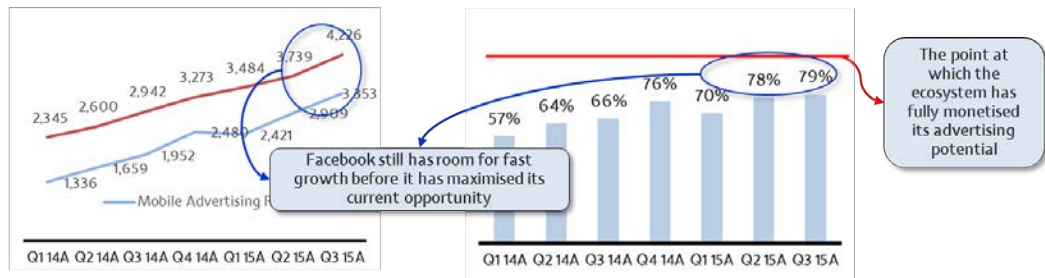
Facebook's efforts to expand its Digital Life offering remain a work in progress in all three segments: gaming, media consumption and search. Of the three, media consumption is the most advanced as Facebook has already registered excellent engagement when it comes to watching videos. Where Facebook will develop its video offering from here is uncertain, but to cover the segment properly it needs to expand into both video discovery and premium content distribution. Widening its offering and leveraging its vast user base could see Facebook become the biggest video destination on the digital landscape. The other two forays are at a much earlier stage, but we think that Facebook M is more developed than the potential gaming offering.

In the meantime, we calculate that Facebook still has room to grow revenues with its existing offering. Using Google as the benchmark (pages 3 and 23), we estimate that in Q315 Facebook monetised 79% of the opportunity available with the assets that it already has in place (Exhibit 20). This gives the company time to develop its strategy for the next leg of growth, but things need to start happening in 2016. This is because the current consensus estimates for revenues in 2016 are greater than those we would predict using this method.

Exhibit 22: Facebook fulfilment of mobile revenue opportunity, Q114-Q315

Quarterly revenues vs. estimates

Addressable market fulfilment by quarter

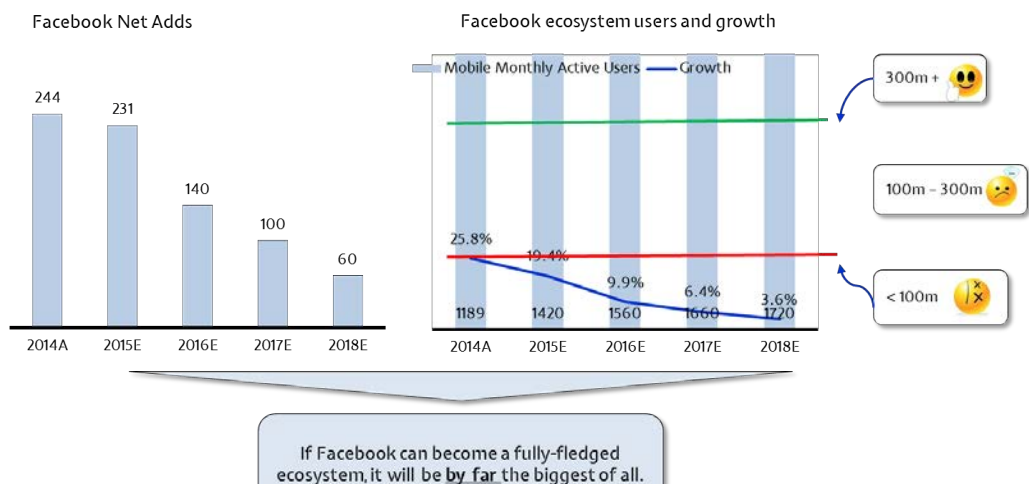


If Facebook can increase Digital Life coverage to 80%, annual addressable revenues from mobile advertising could be \$37bn rather than the \$16bn they are today.

Source: Edison Investment Research, Facebook, Google

According to consensus forecasts, Facebook will generate \$24.0bn in revenues in 2016. Using this method, we estimate that mobile advertising revenues will be \$18.0bn in 2016. Assuming mobile advertising remains at 80% of total revenues, this would give a total revenue estimate of \$22.5bn for the year. Hence, in its current state, consensus for 2016 appears to be too high, raising the prospect of a meaningful slowdown of growth in H216. We believe this will happen unless Facebook can meaningfully improve user engagement in one of the other Digital Life segments during 2016. If growth slows as we expect, the valuation of Facebook is likely to take a hard knock as the market will assume that this is the end of high, sustainable growth. We see this as an opportunity to get involved, as the long-term potential of having three new segments of Digital Life fully up and running is very substantial. Mobile advertising revenues could eventually reach \$37bn over the time frame compared to \$16.5bn today.

Exhibit 23: Forecasts for the Facebook ecosystem, 2014-18

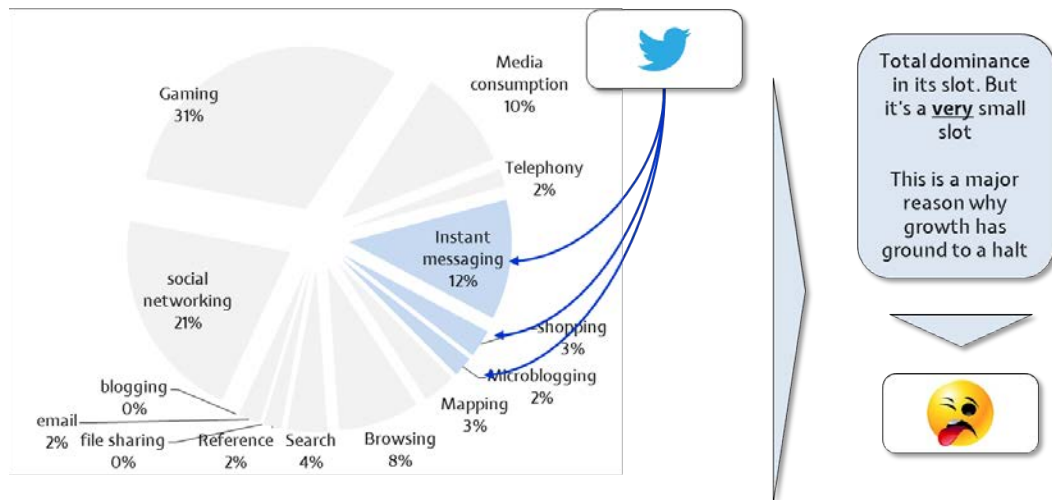


Source: Edison Investment Research, Facebook, Counterpoint Research

Twitter

Twitter has been in paralysis for over a year and there is no sign of taking the badly needed action to restore revenue growth. In many ways, Twitter has been a victim of its own success. It has carved a niche for itself in the Digital Life of users and it utterly dominates that niche. This has been followed by superb execution of a monetisation strategy that has allowed Twitter to fully monetise the opportunity it has carved out for itself. It is here where the problems begin, as its offering is only a very small part of Digital Life, which means it only has 17% coverage of the pie. Furthermore, its service is so niche that it only appeals to a subset of the digital population and that is what has brought its user growth to halt.

Exhibit 24: Twitter's position in Digital Life

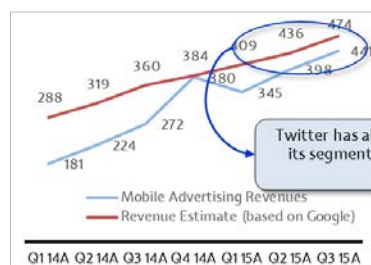


Source: Edison Investment Research, Nielsen, Google, Pewinternert.org, CommScore, NetMarketShare

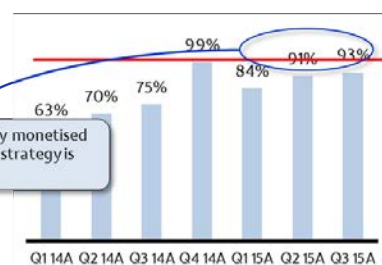
Using Google as the benchmark, we have calculated that Twitter's monetisation of its opportunity has risen to 93% in Q315 from 63% in Q114 (Exhibit 25) and it is expected to pass 100% in Q415. This implies that Twitter's revenue growth will be limited until it can either improve its coverage of Digital Life or see its user base grow once again. We suspect that the lack of user growth is linked to its very narrow Digital Life coverage (Exhibit 24) and that the user base will not improve until the company addresses its lack of strategy for expansion.

Exhibit 25: Fulfilment of mobile revenue opportunity by Twitter

Quarterly revenues vs. estimates



Addressable market fulfilment by quarter



Twitter's growth will be very slow from now on unless it finds a new strategy. Current turmoil will make that very difficult. Valuation demands much higher growth even now

Source: Edison Investment Research, Twitter, Counterpoint Research



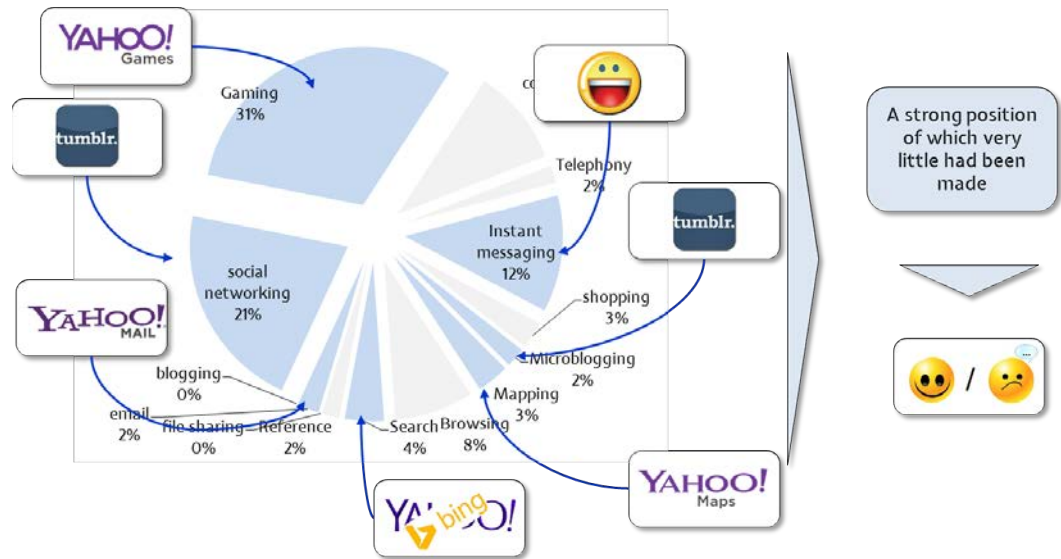
Twitter must reinvent itself if it wants users and revenues to return to growth. This is why the management issue is so important. Twitter needs a deep, focused and committed management team to successfully conceive and execute the badly needed new strategic direction. The problem is that the current team appears to be none of these things, with significant turnover in the last 12 months and the permanent appointment of a part-time CEO. The appointment of Jack Dorsey as CEO does not seem to have fixed the management exodus, which continued in December 2015 with the VP of design, Mike Davidson, announcing his departure in February 2016.

We do not doubt Jack Dorsey's ability; it is simply that a strategic turnaround of this kind is much harder when the CEO devotes half his time to running another company. Furthermore, the IPO of Square has been far from trouble free and so it is easy to see how Twitter is not getting the attention it needs and how the current malaise will prevail. This is why we think that Twitter will continue to languish for some time to come. As growth fails to materialise, the market will most likely lose faith, opening the way for a substantial decline in the multiples on which the shares currently trade. Nonetheless, we see potential for the company to be purchased by one of its competitors, all of which are also looking to expand their reach beyond their current remit.

Yahoo

Yahoo is the opposite of Twitter. Twitter is great at execution and monetisation but has no opportunity, while Yahoo has huge opportunity but is failing to execute. This problem has plagued the company for at least 10 years but, with the arrival of Marissa Mayer in July 2012, it was hoped that things would change. Before her arrival, Yahoo was a company that had purchased leading internet assets only to leave them to wither on the vine. On the strategy front, we give Marissa credit for putting together a series of assets that gave the company a fighting chance.

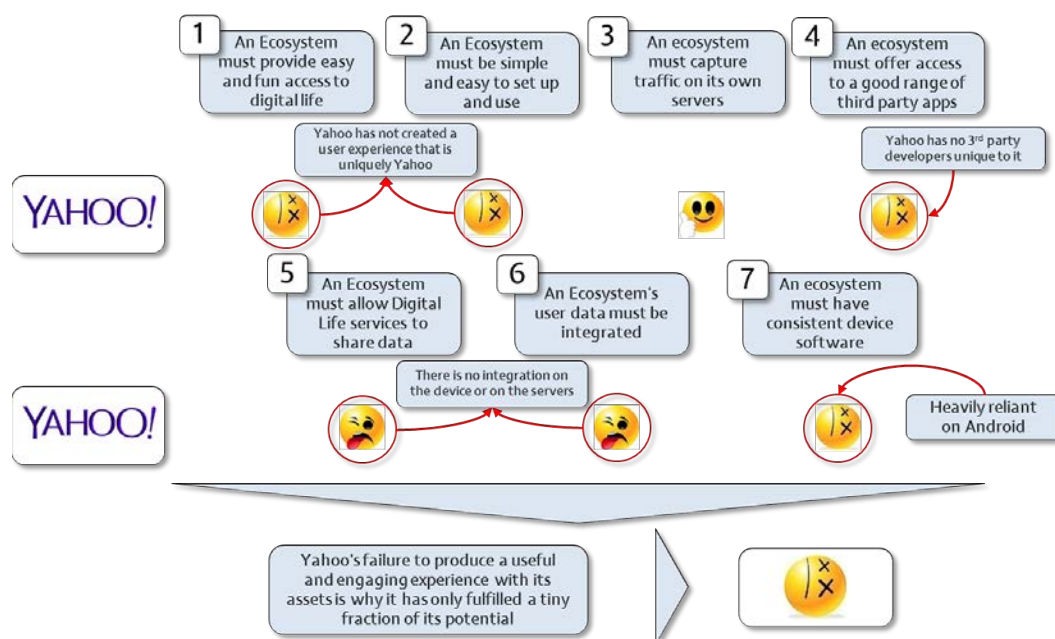
Exhibit 26: Yahoo's position in Digital Life



Source: Edison Investment Research, Nielsen, Google, Pewinternert.org, CommScore, NetMarketShare

At the time of Marissa's arrival, Yahoo had a few ageing assets that were almost entirely in the fixed internet space. She was quick to realise that Yahoo had some huge holes in terms of services and that the existing ones needed sprucing up. So began an acquisition spree that peaked in May 2013 with the purchase of Tumblr giving Yahoo an entry into the important social networking segment, as well as access to around 250 million mobile users. This gave Yahoo 75% coverage of the Edison Digital Life pie and overall industry leadership (Exhibits 24 and 7). However, this compared very starkly with Yahoo's financial performance, which in mid-2013 was mediocre. At the time, it led us to view Yahoo as the dark horse of the industry with enormous potential upside (see *Mobile Software – iRobot*, 6 March 2014).

Following acquisition, assets need to be integrated together and presented to the user on a mobile phone or tablet in an easy and fun to use way. This is how user engagement can be transferred from the desktop onto the mobile and how Yahoo could develop itself as a destination where users could live their digital lives on mobile. This is where everything has come unstuck, as the acquisition spree has not been followed up by execution on the purchased assets. Consequently, Yahoo has very little engagement on mobile despite its claims of 600 million monthly active users (MAUs). We suspect that the majority of these users simply check their email and very little else.

Exhibit 27: Analysis of the Yahoo ecosystem vs the Seven Laws of Robotics


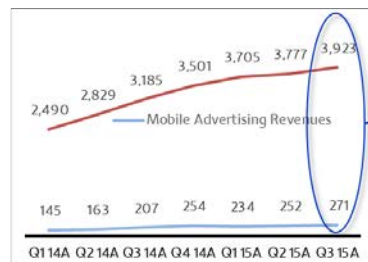
Source: Edison Investment Research

This failure to execute on its assets has also been hampered by a constant exodus of executives over the last 12 months, a situation that shows no signs of abating. The end result is that Yahoo's ecosystem is very little more than a jumble of desktop internet services, to which very little has been done over the last three years. This fact is clear when Yahoo's ecosystem is assessed on the Seven Laws of Robotics (Exhibit 27). Yahoo's failure to create a unique user experience around its assets (laws 1 and 2), as well as its failure to integrate these assets (laws 5 and 6), is primarily responsible for its very weak score. This is exacerbated by its reliance on Android to deliver its ecosystem and its lack of traction with third-party developers.

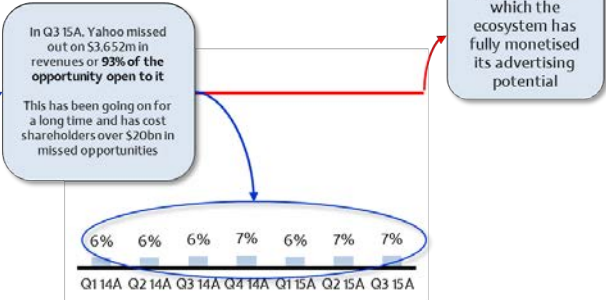
The result of these shortcomings is that when it comes to monetisation, Yahoo is very badly underperforming its potential. It has leadership in coverage of Digital Life and lays claim to 600 million MAUs. When this is benchmarked against Google, very substantial revenues from mobile devices should be forthcoming. Unfortunately, Yahoo is recording just 7% of what we calculate should be possible (Exhibit 26, left-hand side). Most concerning of all was that management was "delighted" to report \$271m of revenues from mobile devices in Q315, which was a quarter of the \$3,923m it could have delivered (if it had delivered to its potential, Exhibit 26 right-hand side). This is worrying because it implies that management is not aware of the opportunity it is missing out on. This stance dashes any hopes we had that it will begin to fulfil its potential any time soon.

Exhibit 28: Fulfilment of mobile revenue opportunity by Yahoo

Quarterly revenues vs. estimates



Addressable market fulfilment by quarter



RFM thinks that Yahoo's failure to execute on the assets that it has is directly responsible. This failure is revealed through its poor score when assessed on the 7 Laws of Robotics.

Source: Edison Investment Research, Yahoo, Counterpoint Research

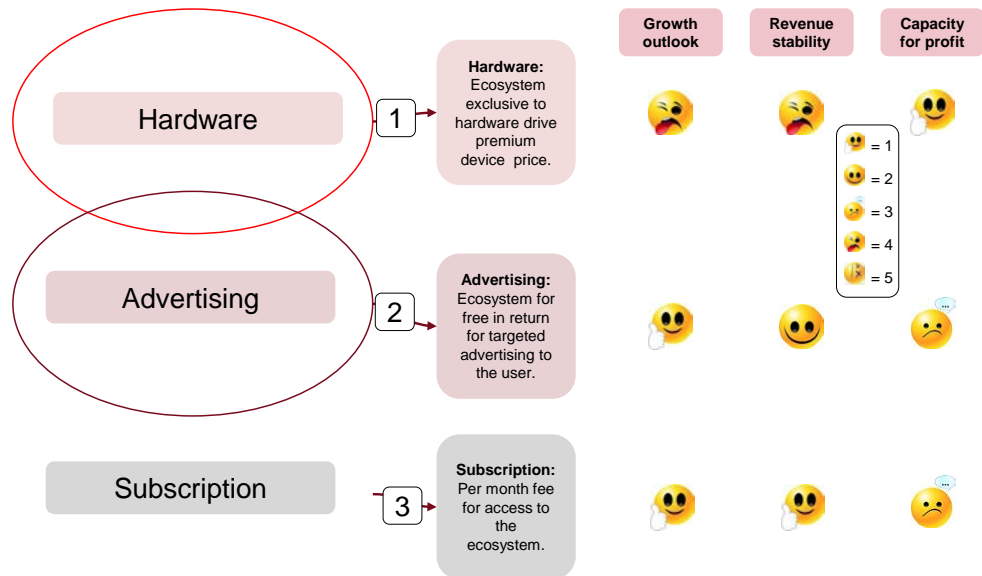
Furthermore, what is left of Yahoo's management is having all its energy consumed by the about-face with regard to its holding in Alibaba. In January 2015, Yahoo said that it would spin off Alibaba into a separate holding company known as Aabaco. However, as it could not get a guarantee from the IRS that this transaction would be tax-free, it has decided to leave Alibaba where it is and spin off everything else. This result is significantly more complicated than just spinning off Alibaba. Hence, what was due to be completed in Q415 will now take at least another year to be resolved.

We think this is highly detrimental for the company's long-term outlook. A turnaround of this size requires focus and stability, particularly in its mobile division, which we believe is almost the exact opposite of what has occurred. On 1 January Jon McCormack joined Yahoo to lead mobile engineering, but we understand that there was immediate friction over the direction that mobile needed to take, which resulted in Jon returning to Amazon just two months later. Even the leadership of mobile itself has not been free of turnover, with Adam Cahan lasting just two years only to be replaced by Jeff Bonforte, who is now responsible for all of Yahoo's mobile assets. Until stability is restored, we think it will be extremely difficult for the company to show any material improvement in its ability to monetise its assets in mobile. Furthermore, for another year, the valuation of the company will continue to be set by outside influences, giving management little incentive to turn around the core business or to even stay at Yahoo. Hence, we do not see any improvement in its ecosystem in the short to medium term.

Monetisation by hardware

We have identified three methods by which an ecosystem can earn a return on its investments: hardware, advertising and subscription (Exhibit 29). Although these methods all monetise the same thing (ecosystem usage), the resulting revenue streams vary wildly in terms of their size and stability. While we view monetisation through advertising and monetisation through subscription as quite similar, the real variation occurs in monetisation through hardware

Exhibit 29: Characteristics of the three models of monetisation



Source: Edison Investment Research

The advantage of monetisation via hardware is the potential to generate vast revenues and profits many times greater than for advertising or for subscription (Exhibit 27). However, this comes at a price:

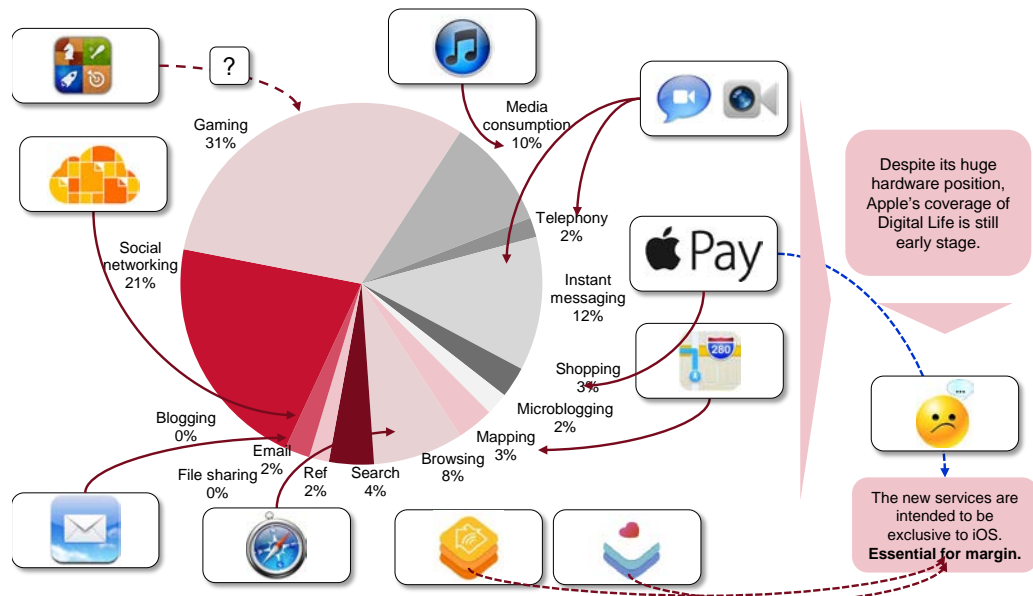
1. The outlook for revenue growth is poor as device markets are becoming saturated, leaving only fighting for market share as a way to grow revenues.
2. Revenues and especially profits are extremely volatile. The examples of Nokia, Samsung, Sony, BlackBerry, Motorola, Ericsson and HTC show that if just one product cycle or market trend is missed, then share, revenues and profits can decline by billions of dollars in a matter of months. Despite the risks, the rewards from hardware can be substantial, which is why we have compared its potential through advertising with hardware for two ecosystems that have chosen the hardware route: Apple (iOS) and Microsoft.

It is important to note that in calculating the monetisation potential, we have compared hardware gross margins rather than hardware revenue itself. In hardware revenue, there are potentially two elements. First, the sale of the hardware itself and second, any value that users attribute to the ecosystem. We believe that gross margin strips away most of the revenue attributable to hardware, giving a better measure of revenue attributable to the ecosystem itself. Gross margin also has the advantage of clearly showing where value is being attributed to the ecosystem and where it is not. The analysis of iOS and Microsoft below clearly demonstrates this point.

iOS

It has been clear for some time that the strength of Apple's offering is not its position in Digital Life (Exhibit 30), but in its ability to distribute the apps and Digital Life services of third parties in an easy and fun to use way. This strength in the user experience has been embedded in hardware that is both desirable and useful, giving the very strong offering that iOS is today. We have long made the case that this is not a sustainable competitive advantage as the other offerings can catch up, but for the last six months the reverse has been true (see *Mobile Ecosystems – Gated Communities*, 13 October 2015). This gives Apple more time to define its long-term competitive advantage, which we continue to believe lies in services such as HealthKit, HomeKit and Apple Pay.

Exhibit 30: Apple's position in Digital Life

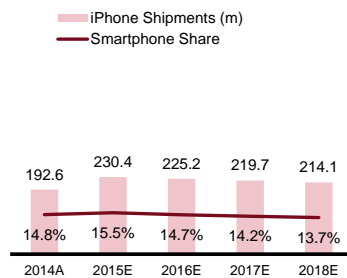


Source: Edison Investment Research, Nielsen, Google, Pewinternert.org, CommScore, NetMarketShare

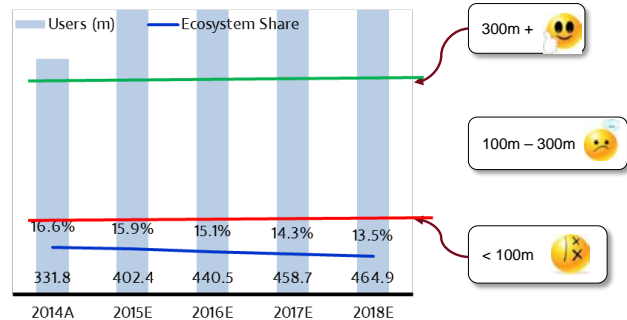
In the interim, iOS remains a financial powerhouse generating substantial revenues and profits. To put iOS's monetisation capability into context, we have compared what iOS could, in theory, generate from an advertising model with what it actually generates in hardware.

Exhibit 31: Forecasts for the iOS ecosystem, 2014-18

Apple iPhone units shipments and share



Apple Ecosystem users and ecosystem share



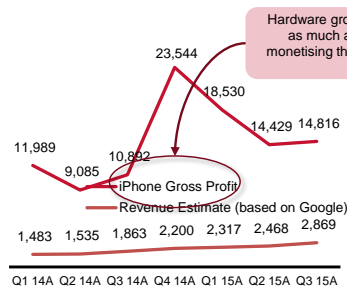
The iPhone 6 and 6s have strengthened Apple's grip on the high end...
...and the gap in terms of quality, fun and usage has widened in the last six months, and is continuing to do so.

Source: Edison Investment Research, Facebook, Counterpoint Research

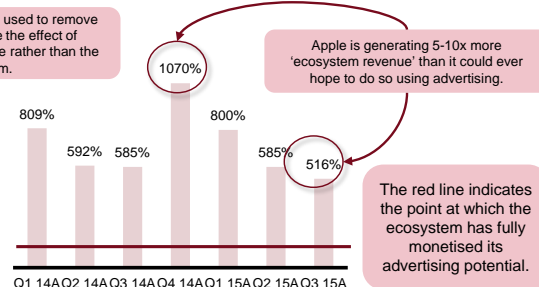
We have taken Apple's position in Digital Life with 40% coverage and the size of its ecosystem (Exhibit 29) and benchmarked it against advertising revenues generated by Google from iOS devices. This exercise reveals a stark difference compared to the gross margin that Apple generates from iPhones. Exhibit 30 shows that Apple is monetising its ecosystem to much greater effect than it could ever hope to do using any other method. Over 12 months Apple has been able to generate 5-10x more 'ecosystem revenue' than it would be expected to do using advertising. We suspect that an analysis of subscription would show the same result, but the early stage of this monetisation method has meant there no good benchmarks to use.

Exhibit 32: Fulfilment of mobile revenue opportunity by iOS

Quarterly gross margin vs estimates \$m



Addressable market fulfilment by quarter



Successful hardware monetisation is **many times** more lucrative than advertising as long as devices meet the fickle demands of users. **It makes no sense for Apple to switch to another method.**

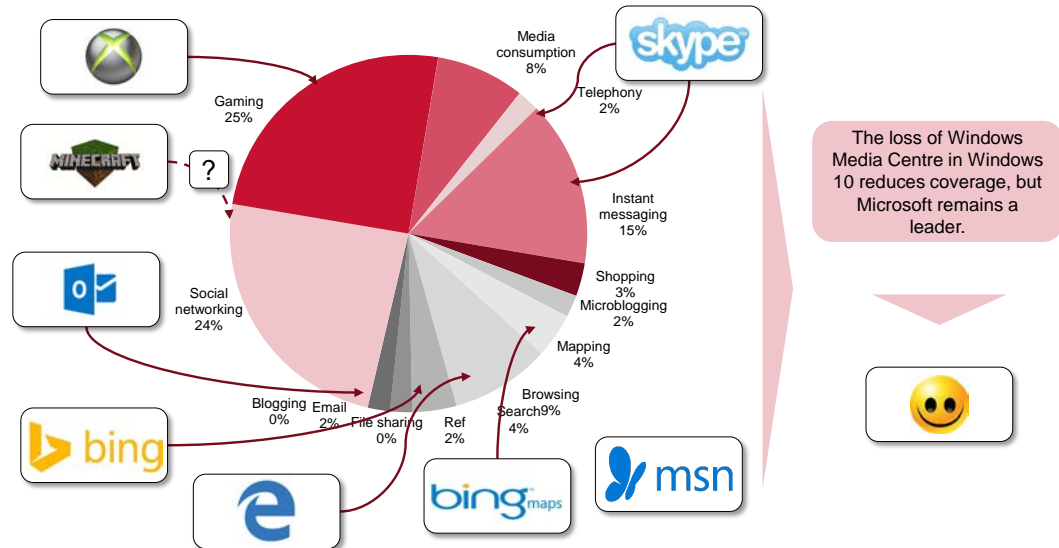
Source: Edison Investment Research, Apple, Counterpoint Research

It is also clear from this analysis that the trade-off that Apple is making in terms of the lower growth and higher volatility in its end-market is paying off many times over. Consequently, it makes no sense for Apple to consider switching to another method of monetisation. This also underlines that the critical factor in Apple's long-term success will be its ability to continue to positively differentiate its devices to maintain its current dominance. Failure to meet these criteria will bring these numbers down extremely quickly as its erstwhile competitors in the handset market have all found, to the agony of their stakeholders.

Microsoft

Microsoft's monetisation of its consumer ecosystem is at the other end of the spectrum compared to Apple and serves as an example of how difficult it can be to monetise via hardware.

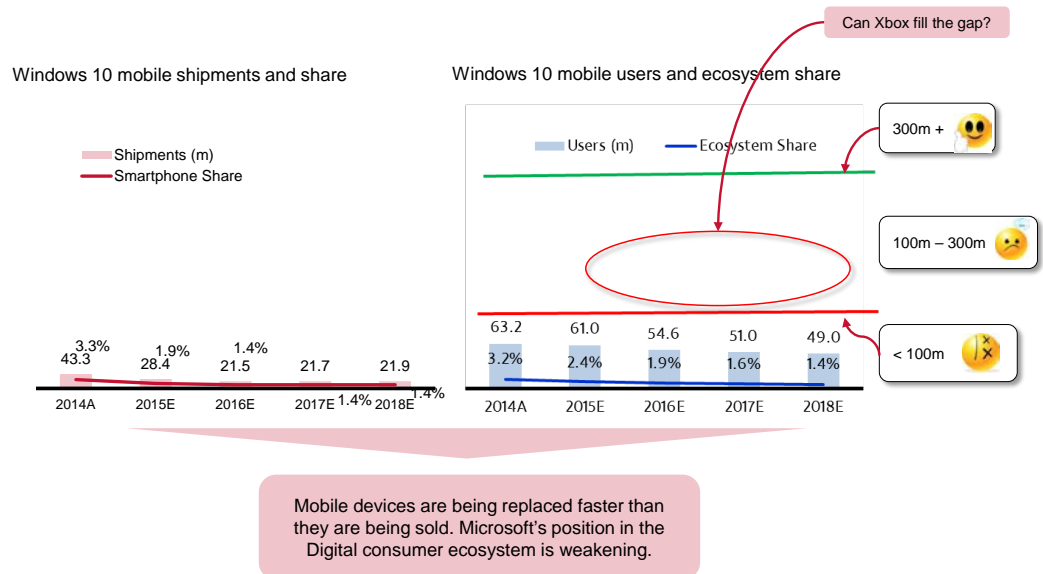
Exhibit 33: Microsoft's position in Digital Life



Source: Edison Investment Research, Nielsen, Google, Pewinternet.org, CommScore, NetMarketShare

Microsoft has much better coverage of Digital Life (Exhibit 33), but its user count is a fraction of where it needs to be and is in fact declining (Exhibit 32). This is largely due to the cuts made to its phone business, where we estimate that 75% of the employees that joined Microsoft from Nokia have been or will be laid off. With just 1.4% market share, users are now replacing Lumia devices more quickly than they are buying them, which means that the number of users of Microsoft's consumer ecosystem is now likely to decline for some time to come (Exhibit 32).

Exhibit 34: Forecasts for Windows 10 on mobile, 2014-18



Source: Edison Investment Research, Counterpoint Research

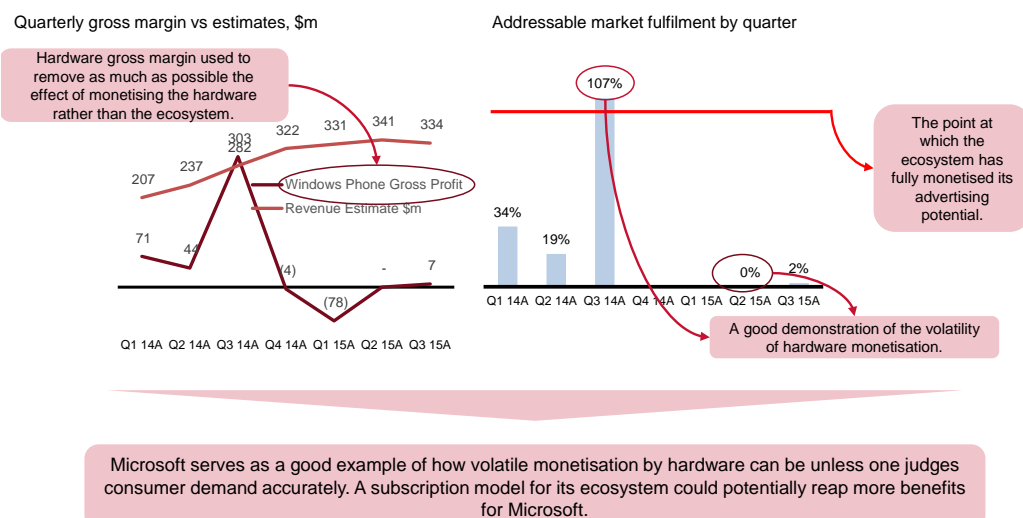
We continue to believe that Microsoft's lack of success with the consumer is in part due to the continued poor performance of its Windows Store (Exhibit 17), but is mostly due to its inability to

explain its proposition to the consumer. This is what we refer to as the Blue Squares of Death problem (see *Microsoft – Mission Impossible*, 2 June 2015,). With the downsizing of resources, this is unlikely to improve in the immediate term.

We fear that Microsoft remains undecided as to what to do about the consumer. Without a thriving ecosystem with at least 100 million users, it is very unlikely to break even when it comes to a return on investment on its consumer assets. The choice remains to either invest to build the ecosystem or to sell off/close the consumer assets. While Windows 10 is still building momentum, Microsoft is likely to remain at the crossroads, but we hope that a decision one way or the other will be made by the end of the fiscal year (June 2016). We do not believe that endless waiting is an option given that consumer assets require constant attention and, with the current strategic stalemate, they are likely to become dated and therefore less valuable.

In the interim period, we see monetisation of the consumer ecosystem remaining at very low levels, raising the possibility of Microsoft considering other methods of monetising its ecosystem. Taking Microsoft's coverage of Digital Life and its user count and benchmarking it against Google indicates that Microsoft could potentially generate around \$330m in mobile advertising revenues per quarter (Exhibit 33). Comparing this to hardware gross margins shows that, apart from one quarter when Microsoft managed to earn 18% gross margins on its hardware, its strategy to monetise its ecosystem through hardware is having no success at all. Furthermore, its performance has been extremely volatile, with large swings in monetisation from one quarter to the next.

Exhibit 35: Fulfilment of mobile revenue opportunity by iOS, Q114-Q315



Source: Edison Investment Research, Microsoft, Counterpoint Research

By running its business at 0% gross margins, Microsoft is effectively giving the ecosystem away but even that has been unable to halt the slide in users and engagement with its consumer assets. This is why we think that the consumer ecosystem needs to either have a decisive strategy for growth and monetisation or for Microsoft to exit completely. This could potentially involve selling assets such as Bing and Xbox and refocusing its efforts on the enterprise. This would cap Microsoft's long-term potential growth, but at the same time refocus the company around the strategies where it knows that it can win. Given how weak the consumer assets have been to date, both in terms of revenues and certainly profitability, we suspect that a withdrawal from the consumer ecosystem would be reasonably well received by the market.

Conclusion

Although the monetisation model is simple, it has proved to be a good measure of how well the ecosystems are faring when it comes to revenue and why. It clearly indicates that monetisation via hardware is by far the best method of monetisation, but also that it comes with great risk and volatility. Used in combination with the Seven Laws of Robotics, it has highlighted where the weaknesses lie at Yahoo and what Twitter needs to do to restart its badly needed growth. Furthermore, it has also highlighted that Microsoft is earning nothing from its ecosystem assets in mobile and will soon need to decide whether it wants to cover the consumer at all. As monetisation methods evolve over the coming years, we will continue to use the benchmark analysis to deepen our coverage and understanding of the ecosystems and their strategies.

Market and ecosystem estimates

Exhibit 36: Mobile ecosystem user numbers and share

Ecosystem users (m)	20 12A	20 13A	20 14A	20 15E	20 16E	20 17E	20 18E
Symbian	50.0	21.2	0.0	0.0	0.0	0.0	0.0
Tizen	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blackberry	0.4	0.4	0.0	0.0	0.0	0.0	0.0
iPhone OS	195.4	257.1	331.8	402.4	440.5	458.7	464.9
Windows	20.0	44.4	63.2	61.0	54.6	51.0	49.0
Facebook	625.0	945.0	1189.0	1420.0	1560.0	1660.0	1720.0
Amazon	12.7	18.2	27.7	42.7	63.0	90.8	129.1
Firefox	0.0	1.2	1.9	2.3	2.5	2.7	2.8
Jolla	0.0	0.1	0.4	0.9	1.2	1.4	1.5
Android	614.5	1030.0	1517.4	1974.2	2327.9	2601.3	2836.5
o/w Google	179.4	360.1	614.3	882.8	1040.3	1163.0	1268.7
o/w China	254.0	421.7	556.9	662.3	699.5	729.7	756.5
o/w Other	181.1	248.2	346.2	429.2	588.1	708.5	811.3
Yahoo!	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Samsung	10.4	117.4	21.2	26.7	30.5	32.9	34.4
Sony	35.0	53.0	63.4	61.7	60.1	59.4	59.2
Xiaomi	7.2	21.6	65.7	108.7	157.8	195.9	224.1
Total	925.6	1523.4	1997.1	2526.0	2913.6	3203.3	3444.0

Ecosystem share of users	20 12A	20 13A	20 14A	20 15E	20 16E	20 17E	20 18E
Symbian	5.4%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%
Tizen	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Blackberry	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
iPhone OS	21.1%	16.9%	16.6%	15.9%	15.1%	14.3%	13.5%
Windows	2.2%	2.9%	3.2%	2.4%	1.9%	1.6%	1.4%
Amazon	1.4%	1.2%	1.4%	1.7%	2.2%	2.8%	3.7%
Firefox	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Jolla	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Android	66.4%	67.6%	76.0%	78.2%	79.9%	81.2%	82.4%
o/w Google	19.4%	23.6%	30.8%	34.9%	35.7%	36.3%	36.8%
o/w China	27.4%	27.7%	27.9%	26.2%	24.0%	22.8%	22.0%
o/w Other	19.6%	16.3%	17.3%	17.0%	20.2%	22.1%	23.6%
Yahoo!	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Samsung	1.1%	7.7%	1.1%	1.1%	1.0%	1.0%	1.0%
Sony	3.8%	3.5%	3.2%	2.4%	2.1%	1.9%	1.7%
Xiaomi	0.8%	1.4%	3.3%	4.3%	5.4%	6.1%	6.5%
Total	100%	100%	100%	100%	100%	100%	100%

Source: Edison Investment Research, Counterpoint Research

Exhibit 36: Global handset shipments by vendor

Total Handsets Units by vendor Units (m)	20 11A	20 12A	20 13A	20 14A	20 15E	20 16E	20 17E	20 18E
Apple	89.3	133.4	159.3	192.6	230.4	225.2	219.7	214.1
Huawei	46.0	49.4	55.7	77.4	106.7	115.9	117.0	118.2
HTC	43.3	32.5	23.0	21.2	17.8	14.8	14.9	15.1
LG	86.4	58.4	71.0	78.4	72.8	70.2	70.9	71.6
Google Motorola	40.3	35.3	16.7	31.7	31.2	24.9	22.9	23.1
Nokia / Microsoft	422.5	335.2	256.0	198.8	118.3	103.8	104.8	105.8
BlackBerry	51.5	36.1	18.7	7.8	3.9	3.0	3.0	3.0
Samsung	316.2	386.2	462.5	401.9	397.0	405.9	410.0	414.1
Sony Mobile	32.6	32.7	38.5	39.8	29.3	28.3	28.5	28.8
ZTE	69.3	69.6	54.3	49.5	66.8	64.2	64.8	65.5
Others	579.6	578.5	586.5	756.0	874.4	912.2	931.3	948.4
	1776.9	1747.3	1742.1	1855.1	1948.7	1968.2	1987.9	2007.7

Market Share Handsets	20 11A	20 12A	20 13A	20 14A	20 15E	20 16E	20 17E	20 18E
Apple	5.0%	7.6%	9.1%	10.4%	11.8%	11.4%	11.1%	10.7%
Huawei	2.6%	2.8%	3.2%	4.2%	5.5%	5.9%	5.9%	5.9%
HTC	2.4%	1.9%	1.3%	1.1%	0.9%	0.7%	0.7%	0.7%
LG	4.9%	3.3%	4.1%	4.2%	3.7%	3.6%	3.6%	3.6%
Google Motorola	2.3%	2.0%	1.0%	1.7%	1.6%	1.3%	1.2%	1.2%
Nokia / Microsoft	23.8%	19.2%	14.7%	10.7%	6.1%	5.3%	5.3%	5.3%
BlackBerry	2.9%	2.1%	1.1%	0.4%	0.2%	0.1%	0.1%	0.1%
Samsung	17.8%	22.1%	26.5%	21.7%	20.4%	20.6%	20.6%	20.6%
Sony Mobile	1.8%	1.9%	2.2%	2.1%	1.5%	1.4%	1.4%	1.4%
ZTE	3.9%	4.0%	3.1%	2.7%	3.4%	3.3%	3.3%	3.3%
Others	32.6%	33.1%	33.7%	40.8%	44.9%	46.3%	46.8%	47.2%

Smartphone % Market	27%	39%	60%	70%	76%	78%	78%	78%
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Source: Edison Investment Research, Counterpoint Research

Exhibit 37: Global smartphone shipments by vendor

Of Which Smartphones Units by vendor Units (m)	20 11A	20 12A	20 13A	20 14A	20 15E	20 16E	20 17E	20 18E
Apple	89.3	133.4	159.3	192.6	230.4	225.2	219.7	214.1
Huawei	15.6	29.0	48.1	75.4	106.2	115.5	116.7	117.9
HTC	43.0	32.5	23.0	21.2	17.8	14.8	14.9	15.1
LG	19.0	26.4	47.7	60.2	61.2	62.8	63.5	64.1
Google Motorola	17.4	16.6	16.2	31.7	31.2	24.9	22.9	23.1
Nokia / Microsoft	84.6	36.4	33.6	42.4	28.4	21.5	21.7	21.9
BlackBerry	51.5	36.1	18.7	7.8	3.9	3.0	3.0	3.0
Samsung	90.5	212.4	322.5	313.5	327.4	338.4	341.8	345.2
Sony Mobile	19.6	34.8	38.5	39.8	29.3	28.3	28.5	28.8
ZTE	10.5	29.5	36.2	39.9	60.4	60.3	60.9	61.5
Lenovo	0.0	19.9	46.2	63.1	43.7	48.9	49.4	49.9
Xiaomi	0.0	7.2	18.8	61.2	76.3	91.8	93.0	94.0
Coolpad	0.0	19.0	32.5	40.7	30.8	31.6	31.9	32.3
Others	27.2	20.7	23.0	30.7	53.5	207.7	315.6	440.9
Total	146.3	185.7	299.2	471.7	686.7	1048.9	1305.1	1487.9

Market Share Smartphones	20 11A	20 12A	20 13A	20 14A	20 15E	20 16E	20 17E	20 18E
Apple	18.9%	19.4%	15.2%	14.8%	15.5%	14.7%	14.2%	13.7%
Huawei	3.3%	4.2%	4.6%	5.8%	7.1%	7.5%	7.5%	7.5%
HTC	9.1%	4.7%	2.2%	1.6%	1.2%	1.0%	1.0%	1.0%
LG	4.0%	3.9%	4.5%	4.6%	4.1%	4.1%	4.1%	4.1%
Google Motorola	3.7%	2.4%	1.5%	2.4%	2.1%	1.6%	1.5%	1.5%
Nokia / Microsoft	17.9%	5.3%	3.2%	3.2%	1.9%	1.4%	1.4%	1.4%
BlackBerry	10.9%	5.3%	1.8%	0.6%	0.3%	0.2%	0.2%	0.2%
Samsung	19.2%	30.9%	30.7%	24.0%	22.0%	22.0%	22.0%	22.0%
Sony Mobile	4.2%	5.1%	3.7%	3.0%	2.0%	1.8%	1.8%	1.8%
ZTE	2.2%	4.3%	3.5%	3.1%	4.1%	3.9%	3.9%	3.9%
Lenovo	0.0%	2.9%	4.4%	4.8%	2.9%	3.2%	3.2%	3.2%
Xiaomi	0.0%	1.0%	1.8%	4.7%	5.1%	6.0%	6.0%	6.0%
Coolpad	0.0%	2.8%	3.1%	3.1%	2.1%	2.1%	2.1%	2.1%
Others	6.5%	7.8%	19.8%	24.2%	29.6%	30.5%	31.1%	31.6%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: Edison Investment Research, Counterpoint Research

Exhibit 38: Global smartphone shipments by OS

Smartphones Units by OS Units (m)	20 11A	20 12A	20 13A	20 14A	20 15E	20 16E	20 17E	20 18E
Symbian	88.4	28.1	13	0.0	0.0	0.0	0.0	0.0
BlackBerry	515	37.8	18.7	7.8	3.9	3.0	3.0	3.0
iPhone OS	89.3	133.4	153.4	192.6	230.4	225.2	219.7	214.1
Windows Mobile / Phone	8.8	17.5	37.8	43.3	28.4	21.5	21.7	21.9
Linux	3.8	19	3.3	6.5	7.4	7.7	7.8	7.8
Android	219.5	449.1	785.8	1031.1	1201.8	1260.1	1284.7	1315.1
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Others	10.4	18.8	48.8	23.9	16.0	17.8	13.7	4.1
Total	4717	686.7	1048.9	1305.1	1487.9	1535.2	1550.5	1566.0

Smartphones Share by OS%	20 11A	20 12A	20 13A	20 14A	20 15E	20 16E	20 17E	20 18E
Symbian	18.7%	4.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
BlackBerry 9 and older	10.9%	5.5%	1.8%	0.6%	0.3%	0.2%	0.2%	0.2%
iPhone OS	18.9%	19.4%	14.6%	14.8%	15.5%	14.7%	14.2%	13.7%
Windows Mobile / Phone	1.9%	2.5%	3.6%	3.3%	1.9%	1.4%	1.4%	1.4%
Linux	0.8%	0.3%	0.3%	0.5%	0.5%	0.5%	0.5%	0.5%
Android	46.5%	65.4%	74.9%	79.0%	80.8%	82.1%	82.9%	84.0%
Others	2.2%	2.7%	4.7%	1.8%	1.1%	1.2%	0.9%	0.3%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: Edison Investment Research, Counterpoint Research



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