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Introduction

Not so very long ago CIBER opened the eyes of information professionals and publishers to what the Google Generation¹ were up to in the virtual, unmediated digital information space.² Information-seeking was fast, furious, abbreviated, and promiscuous; bouncing and skittering were the preferred forms of behaviour; viewing was preferred to reading; few people undertook advanced searching; and everyone used Google. Follow-up work showed it was not just the Google Generation, but also virtual scholars, that were behaving in ways not quite what librarians and publishers had envisaged when designing their websites and databases.³ The supposed orderly information-seeking and reading behavior of the scholar had been transformed by the move to the digital world, the huge range of choices offered, and the data storm unleashed. Fast-bag pick-up (grab a PDF and get out quickly) and reading 'lite' are the order of the day as scholars develop new strategies for dealing with expanding choice and the unending data deluge.

However, we have seen nothing yet: with publishers and librarians not having had time to catch breath and take stock of the first revolution, another revolution is already on us, the mobile revolution – a revolution that is likely to be bigger than the first one. The mobile revolution constitutes another massive round of disintermediation and migration. More people have phones than computers. We are not so much talking about the mobile phone, which has now been with us for 40 years, but the smartphone and tablet. Americans are clearly leading the charge with 56% of them now (2013) owning a smartphone⁴ and 34% owning a tablet,⁵ and where the Americans have gone others will follow. According to communications industry estimates, if the mobile device is not already the main platform for searching the Web, it will be next year.⁶ The day when most informa-

The second digital transition: to the mobile space – an analysis of Europeana

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ABSTRACT. *According to industry estimates the mobile device (smartphone and tablet) will soon be the main platform for searching the Web and yet our knowledge of how mobile consumers use information – especially scholarly information, and how that differs from desktop or 'tethered' users – is imperfect to say the very least. This article aims to correct this through an analysis of the usage logs of a major cultural, multimedia website, Europeana.eu, which started tackling the mobile challenge in 2011. The challenges of identifying mobile use – no easy matter – are described. The information behaviour of 150,000 mobile users is examined and compared with that for desktop users. The main findings are that mobile users are the fastest-growing user community and that their visits are very different in the aggregate from those arising from desktops. Mobile visits are information 'lite': typically shorter, less interactive, and with less content viewed per visit. Use takes on a social rather than office rhythm, with use peaking at nights and weekends.*

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tion-seeking and reading was undertaken via a PC in a library or office is going. Instead of information-seeking and reading taking place in the library and office it will take place on the train, coffee shop, and kitchen table. We could not have travelled further from the original library-tethered online computer. And, as we shall learn, the change of environment and context inevitably changes the nature of searching and reading.

While the first transition, from the physical to digital, transformed the way we seek, read, trust, and consume information, until relatively recently the environment and conditions in which scholars conducted these activities had not really changed – it was still largely in the library or office, sometimes the home.

However, with the second transition to the mobile environment, information behaviour is no longer mediated or conditioned by the office or library (and its rules and impositions), but by the street, coffee shop, home; in a nutshell by social norms. The mobile device is after all embedded in daily life. This means that information usage and seeking has not only moved environments, it has been time-shifted too. There are other significant differences which will inevitably lead to changes in the composition of the user population and their information-seeking behaviour:

1. With mobile devices, people can meet their information needs at the very time of need, rather than cold store their information need until they reach the office, library, or home. Logically this should mean that more needs are met, after all if you have to store them there is always the likelihood that they may be forgotten or overwritten by another need. So might we expect more visits and searches from mobile users overall?
2. While library 'Big Deals' give great access to information to a privileged few, behind the garden walls the mobile device gives access to masses of information to everyone and anywhere; and, for scholars, open access publishing is busy increasing the haul. Open access publishing gives those outside the paywalls what was once inside the walls, so if you have a mobile you can access journals you could never view on subscription.

3. Mobiles are essentially social media devices and that means they straddle the two major information domains, the informal and formal; publishers have been trying hard (but not really succeeding) to marry the two and perhaps the mobile device offers some possibilities for them.
4. Mobiles are an intrinsic part of the digital consumer purchasing process – they are used to search for information prior to purchase, during the process itself, and, of course, to make the purchase. It is possible that scholars, who are also digital consumers, might be more likely to go down the pay-per-view route;
5. People appear to trust the mobile phone more than any other form of information and communication technology.⁷ Just like they now trust Google. We have come a very long way in a very short period of time. It has been quite some time since libraries introduced bans on phones; now ask any young person (and growing numbers of not so young people) about their library and they will point to their smartphone. What an irony: the mobile is becoming the library!⁸

It is pretty clear, then, that mobiles devices have a huge potential to draw in a larger audience for scholarly information, change the nature of information-seeking behaviour and to do this for billions of people, yet despite the considerable challenges for all stakeholders in the scholarly communications market we know very little about (i) how users behave in the mobile environment; (ii) how this behavior differs from that associated with laptops and desktops.

This paper hopefully fills a gap in our knowledge with an analysis of the usage logs of Europeana, the interface to Europe's cultural digital culture.

Europeana, launched in 2008 as a prototype and operating as a full service since 2010, is a gateway, portal, or search engine to the digital resources of Europe's museums, art galleries, libraries, archives, and audiovisual collections (Figure 1). Europeana is regarded as trusted (curated) source, connecting users directly to authentic and curated material. It provides multilingual access to 26 million European cultural objects in 2,200 institutions from 34 countries. Books and manuscripts, photos

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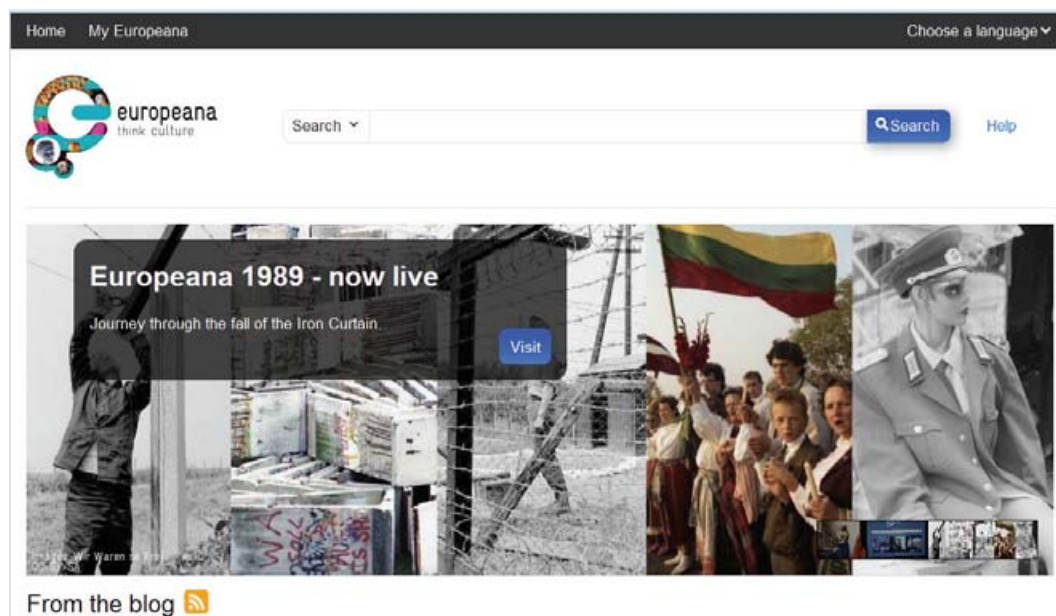


Figure 1. Europeana home page.

the site currently attracts around five million visitors and is used heavily by humanities scholars

and paintings, television and film, sculpture and crafts, diaries and maps, sheet music and recordings, they're all there. Europeana claim, tongue-in-cheek, that there is no longer the need to travel the continent, either physically or virtually. If you find what you like you can download it, print it, use it, save it, or share it.⁹

While Europeana is essentially a portal, it also has aspirations well beyond that; it believes it can help stimulate the European digital economy; it also mounts online exhibitions and takes part in crowd-sourcing experiments (World War 1 is currently the subject of such an experiment). Europeana is also working with other digital channels to distribute their content, most notably Google, Wikipedia, and Facebook.

The site currently attracts around five million visitors and is used heavily by humanities scholars and has a seasonal academic pattern of usage common to most publisher platforms. Europeana, with one eye on a strategic market for them, tourists, who are of course interested in culture and who could benefit considerably from information on the go, started considering the mobile user in its development plans and has had to adapt its plans as a result of the rise of the tablet. Europeana has been successful in this and now (2013) boasts 155,000

mobile visitors, whose behaviour is the subject of this paper.

Out of the five million or so total users, mobile users still constitute very much a subset of the Europeana's user population, but their real significance lies in the fact that they constitute a potential wave of the future. The mobile users covered in this paper are not all academic users of publications or members of the Google Generation, some are librarians and heritage professionals and others tourists, but for publishers there are important lessons that can be learned that can portend the behaviour of scholars since ultimately a scholar is also a digital consumer.

Methodology

As part of the Europeana Connect research program (2009–11) the EU commissioned CIBER to evaluate the usage of the Europeana website. We later obtained a further commission from Europeana to continue usage analysis until April 2013 and investigate in particular mobile usage. Log analysis techniques were employed to study users' interactions with the Europeana website. We studied how people actually seek, search, navigate, use, and act upon information in the virtual space that is

*this dataset
contained 200
million page
views made
by 8 million
unique visitors*

Europeana. When log analysis is used to provide very detailed, bespoke, user-oriented analyses of digital services and sites, as it is in this study, we call it 'deep' log analysis to distinguish it from 'flat' log analyses of the kind produced by COUNTER and the somewhat deeper analyses obtained from Google Analytics. The log files included the usual log fields such as date, time, IP, referrer, and user-agent and our own software was used for data extraction and analysis. The HTTP access logs were supplemented with data obtained from Clickstream logs and Google Analytics. More information on the techniques and comparisons of various methods of obtaining digital usage data can be found in a report by CIBER¹⁰ and in an article by Nicholas and Clark.¹¹

In all, Europeana supplied us with three years of standard log files (October 2009–December 2012). This dataset contained 200 million page views made by 8 million unique visitors. This data was supplemented by Google Analytics data since September 2012. Various time windows and subsets are used in this paper to evaluate mobile behaviour, and because of the fast changing (growing) mobile environment we have always favoured the most current time window.

Admittedly, there is no way to be sure that a user is 'unique' without imposing a user-login requirement (and even that may be subject to caveats). A Google Analytics 'unique user', for instance, is identified when visits are linked by a user-identifying cookie. This cookie may not be present, or may be regenerated between visits, for a variety of reasons: the cookie is refused or deleted by the user after each visit; the user accesses the site using more than one device or browser; visits are so infrequent the cookie expires (a maximum of two years). In addition, it needs to be taken into consideration that mobile users, especially those most likely to be using services beyond plain voice and SMS, are likely to upgrade frequently. Thus all analysis regarding 'return visits' is systematically biased to the short term (hours and days rather than weeks or months).

Unfortunately, identifying mobile use is not straightforward. Before mobile usage can be measured we must first solve a twofold problem of identification: (i) what is a mobile device and how do we know it? Laptop, netbook, smartphone, tablet, e-book: the categor-

ies and form-factors remain in flux. Not so long ago a laptop computer would have been considered mobile, but today, particularly for the home user, many have taken the place of a desktop. Many, possibly most, rarely leave home, the battery serves mainly as a UPS; though wireless, the connection is tethered firmly to broadband wired into the home.

Mobility is relative to expectations, to a past experience of what was not mobile. From the desktop perspective, tablet computing affords mobility; for the smartphone user a 7-inch tablet looks like an encumbrance. The 'mobility' of a device is therefore an emergent quality: a character of the device but also of how and where it is used. So, a definition of a mobile device needs to be intuitive. But it is not enough to satisfy our innate impression that we know mobile usage when we see it; after all we want to analyse thousands or millions of logged instances: that requires a robust, logical definition. A definition that can be programmed, and extracted mechanically from the available data. It must be feasible, given the information we can practically gather. Otherwise we have a category mistake, referring ostensibly to one phenomenon whilst actually analysing another.

So what data do we have? Identifying Web devices as 'mobile' can have more than one purpose: it can be used to provide the user with a service that matches the capabilities of the device and it can provide information to the service provider about a 'mobile' market segment. For the purpose of matching content to the capabilities of the device it is not always necessary to send information back to the provider; style sheets and JavaScript in the browser can modify page formatting at the user end. In such a case providing usage data to the service provider about a 'mobile' market segment may be a secondary consideration. The result can be tautological: the user is considered mobile because a mobile version of a style sheet or other content was requested. This was a noticeable problem on the introduction of tablet computers such as the iPad; often these were detected as an iPhone and served a mobile version of content that was not suited to the larger screen.

Today, with the boundaries between phone and pad ever harder to call, use of a style sheet media type is even less reliable as an

indication of ‘mobility’. The best solution to matching presentation to device is what it has always been: good design that flows with the device rather than assumes a fixed page format. So, the presentation of content is not a sure guide to ‘mobility’, we need to know what sort of device, and where it is, and probably something about the user and the content. ‘Mobility’ is a function of all of these.

Parsing the user agent string that is usually sent to the server with every request can reveal the brand, model, and version of a phone or tablet. But not always, and often there is both too much and too little information. There is no standard format for the user agent string, and over the years it has become cluttered with both redundant and unnecessary data. One solution presents the challenge of maintaining a near complete catalogue of every known version; the alternative is to categorize using fuzzy logic.

If the user agent string alone is not enough, what else do we have? JavaScript on the browser can obtain much of the information in the user agent string but in a more controlled format. We can identify device models directly rather than using heuristics or catalogues. And interrogating the browser adds a bit more; the screen size can be an important clue to the mobility of the device. But increasingly only in terms of limitation: a screen size of less than 800×600 is, in 2013, unlikely to be a desktop or laptop, 1600×1200 is certain to be a desktop not so much because of its size as the aspect ratio: notebooks and tablets are wide-screen. The popular mid-range 768×1024 is most likely found in a mobile device: the giveaway is the portrait format. The same might apply to 800×1280 , but turn that 90° and 1280×800 could be a tablet or a laptop that has been tethered to a desk for years.

Another clue to ‘mobility’ may be sought in the location. But this also is no longer as certain as it once was. Standard logging records the IP address and this can be resolved to reveal the network provider and possibly the identity of a large organization allocated an IP block of its own. Services such as GeoIP (Maxmind.com) pool a variety of information to give moderately reliable location information: most of the time it will get it right to the level of a large city. But mobiles are mobile: when examining historical data such as log

records we need to keep in mind that the estimated location provided by today’s database lookup may not be the same as the location when the log was laid down. Therefore most of the time location information is, like screen resolution, informative in the negative: easier to isolate a minority of not-mobiles than confirm mobility. Not so long ago most university users would have been using terminals in large cluster rooms; the IP address would have been sufficient to identify the institution, probably department and campus; the user agent would reveal the operating system, and desktop could be assumed. Today the student is more likely to be using a laptop or tablet in the café across the road. We no longer have an association with the institution; the location is approximate. The student may be in the library, but whether the library is in Café Nero, Costa Coffee, or Starbucks we cannot tell.

The CIBER analysis of Europeana mobile usage (both http access and Clickstream) is based for the most part on user agent and IP using a heuristic which incorporates pattern matching with lazy evaluation, and dynamic optimization of a greedy algorithm. Or, using plainer language, most cases are easy to call by the experimenter eyeballing the raw log data. We capture that in a set of expert rules. We refine their application by learning and optimization. In effect most cases are easy, and if we can deal efficiently with the majority, then overall performance will not be hit by having to apply complex rules to corner cases. Thus we need to monitor two error rates: false identification (positive or negative) through misapplied rules, and cases where we drop-off the end of the process without achieving a determination. For both, the error needs to be below a noise threshold relative to the effects we would like to measure. Google Analytics, which we also used have only been identifying mobile usage in their reports since October 2011 and typically Google do not tell us how they identify mobiles.

Information seeking in the mobile space

In this section we will describe a comprehensive range of characteristics of mobile information use – volume and growth in use/users, type of mobile phone used, time period when used, a batch of standard information-seeking metrics, user categorization by behavioural

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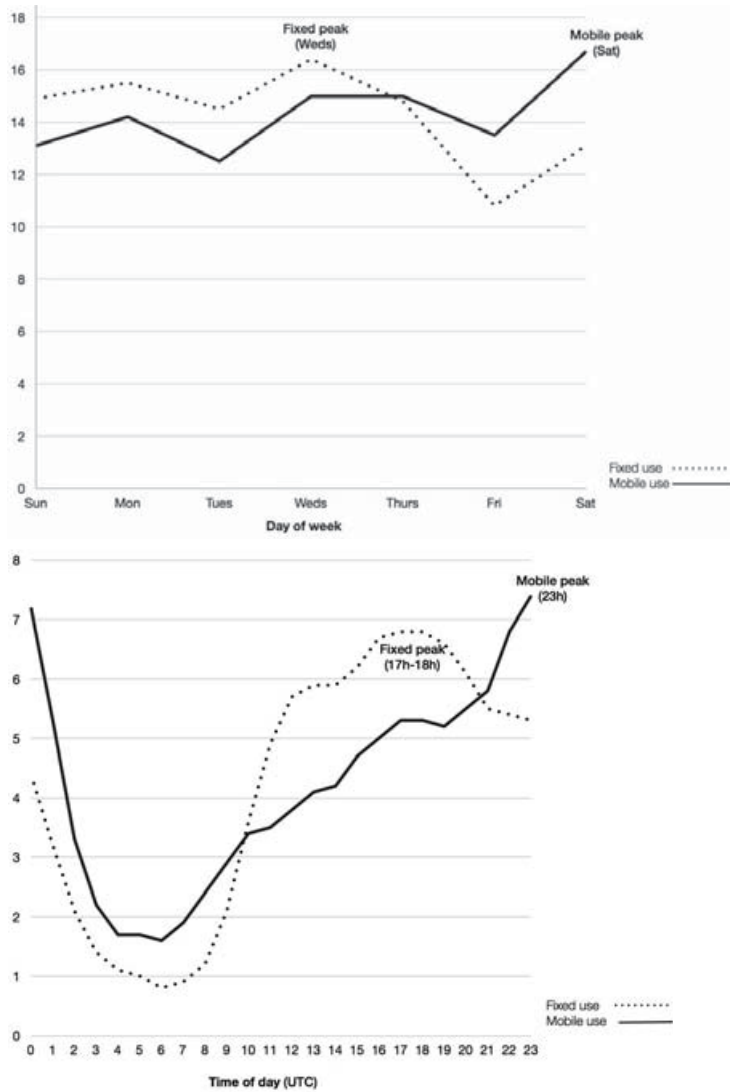


Figure 2. When is Europeana used?

pattern, levels of user engagement and loyalty, social referrals, and virtual exhibitions. Where appropriate and relevant, mobile use is compared with desktop or fixed machine use.

Volume of use and growth

Europeana currently (2012) attracts just over 155,000 mobile visitors per year who make more than a million page views. Mobile users are, therefore, a significant group already for Europeana in terms of numbers and volume of use, but the most significant statistic is that mobile numbers are growing around *five*

Table 1. Which countries top the list for mobile use of Europeana? (June–December 2012)

Country	Total	% of total
Germany	74,036	9.9
USA	63,337	8.5
Netherlands	60,320	8.1
France	53,071	7.1
UK	50,343	6.8
Spain	47,292	6.4
Norway	42,135	5.7
Italy	39,914	5.4
Sweden	25,557	3.4
Denmark	17,009	2.3
All 'mobile'	744,686	100
% mobile	4.18%	
All users	17,819,822	

times faster than that for 'fixed devices' during the year 2012. So although mobile device page views now (December 2012) account for nearly 5% of all views, this percentage is going to be a lot higher in 2013. To put mobile device use in context, it is way bigger than that from users being referred from social media sites who account for just 1% of page views, and growing at a fraction of the mobile rate.

Table 2. Which types of mobile device do Europeana visitors use? (Page views, June–December 2012)

Device	Total	% of total
iPad	351,855	47.2
Android	169,018	22.7
iPhone	161,358	21.7
Opera Mini	25,844	3.5
other_mobile	16,730	2.2
BlackBerry	9,166	1.2
Windows	4,274	0.6
Symbian	3,727	0.5
Opera	2,714	0.4
All 'mobile'	744,686	100
% mobile	4.18%	
All users	17,819,809	



Figure 3. CIBER dashboard: fixed and mobile users compared.

Country of use

We can detect from the logs where the Europeana mobile traffic comes from and Table 1 shows that Germany produces the greatest amount of traffic, with more than 74,000 page views made during the six-month period June–December 2012. Despite the distance and the fact that their digital cultural collections are obviously absent from Europeana, the USA comes second with over 63,000 views. In terms of per capita use, the Netherlands and Norway rank particularly highly. Some of the Netherland’s use has to be discounted as it is the home of Europeana and many of its devel-

opers are mobile device users. In 2011 France was the biggest user by some margin, showing how dynamic the market is.

Type of mobile device used

Mobile use, at least as far as Europeana is concerned is not smartphone but tablet use, and overwhelmingly the iPad. Table 2 shows that nearly half (47%) of all ‘mobile’ use during the last six months of 2012 comes from an iPad. If we include the iPhone (ranked third), then clearly Apple machines dominate mobile use of Europeana, accounting for close to 70% of all mobile use.

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Figure 4. CIBER dashboard: mobile platforms compared

When people visit Europeana

The intensity of Europeana use (Figure 2), as expressed by page views, varies between the week and the weekend and at different times of the day as people shift between different contexts and personas, from the professional to the personal. Fixed-machine use peaks in the late afternoons and on Wednesdays, whereas mobile phone usage peaks on a Saturday and late into the evening. Clearly, mobile devices have considerably widened access to Europeana at weekends and outside of traditional office hours.

Comparative information-seeking behaviour (mobile v. fixed platforms)

As we have noted, mobile use is growing at a considerable rate, and to understand the significance of this we need discover how mobile users search and how differently this is to the digital searching conducted on desktops and laptops that we have become used to in recent years. The dashboard analysis (Figures 3 and 4) that follows, which provides data on a range of usage metrics, makes it very clear that there are considerable differences and that all the data points to the fact that visits from mobile devices are much shorter and less interactive than those from fixed platforms. Thus (Figure 2):

- A typical mobile visit at just over a minute – hardly a long time anyway, is actually 10 seconds (13%) shorter than that for a fixed-computer user. This might well be explained by the cost of phoning and the fact that some users are tourists, who might incur greater costs being away from home.
- Mobile visits are less busy with fewer pages viewed – nearly 6 compared to nearly 9 pages for the fixed user (30% less).
- Fewer searches are conducted, an average of 0.9 compared to 1.4 (36% less).
- Fewer records are viewed, 1.7 compared to 2.5 (32% less).

On only one metric do mobiles score more highly and that is the time spent on a page view. Mobile users spend on average more than twice as long per page, but this is only to be expected given the relatively slow performance of these devices in many situations and the difficulties of reading stuff on the screen;

something, of course, which is changing as we write.

Another dashboard (Figure 4), this time comparing the performance of three popular mobile devices (Blackberry, iPhone, and iPad), shows clearly that the behaviour of mobile Europeana users is heavily shaped by the kind of device they use. The limited screen real estate and slowness of the Blackberry is clearly a limiting factor for information seeking, as too is the possibility that they are corporate phones and there maybe limitations on their personal use. Just look at the data: duration of visit (19.4 seconds), pages per visit (3.5), time per page (5.5 seconds), search page views per visit (0.4), queries per visit (0.3), and records viewed per visit (1.0) On the other hand, the iPad generates usage metrics that are not hugely dissimilar from fixed machines, and the iPhone performance falls somewhere between that of the Blackberry and the iPad.

Categorizing mobile users by their information-seeking behaviour

A cluster analysis of the key usage metrics shows that the digital footprints that visitors leave behind are clearly structured and suggest that there are three basic types of mobile information-seeking behavior: bouncing, checking, and exploring (Table 3).

The majority of Europeana visitors (52%) are ‘bouncers’ who only view a single page, very likely having been swept there courtesy of a general search engine such as Google. A possibly high proportion will never return, but that is not to say that they may not have extracted valuable facts or information from that visit. A large minority of mobile users (42%) make relatively brief visits of just below 2 minutes and engage with Europeana, typically conducting a single search and viewing several pages of content. A small but relatively high proportion of these visits are referrals from social media or blogging sites (a third more referrals than expected) and this indicates interesting potential for the social media plus mobile use combination. We are associating these kinds of visits with a form of ‘checking’ behaviour – they appear to be fact-finding or checking in nature, short and sharply focused. This leaves a small minority, around 6% of visits, that are characterized by considerably longer duration (around 10 min-

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Table 3. Categorizing users by information-seeking behaviour

Cluster	% of mobile users	Name	Description
1	52	Bouncers	Visits involve viewing a single page only. Come via a search engine and tend not to come back.
2	42	Checkers	Make relatively brief visits of less than 2 minutes, involving a single search and the viewing of 3–4 pages. Appear to be fact finding. A fair proportion of visits are from social media sites.
3	6	Explorers	Conduct relatively long (10 minutes plus) research-intensive sessions which are characterized by 4.5 searches and around 12.7 pages viewed.

utes) and much higher degrees of interaction with Europeana software and content. This is the kind of behaviour that one would associate with a need for more in-depth research or perhaps users who are simply exploring the website to see what Europeana can offer them. This, of course, is the group we would be looking at in order to identify Europeana's core users

Engagement/satisfaction

The question that many people ask is how engaged are mobile users? We can get some idea from the logs by defining user engagement in terms of: (a) the duration of a visit; and (b) the number of pages viewed during a visit. The most recent Europeana data (December 2012) shows that 60% of visits are incredibly short (<10 seconds); and <2% are recorded as exceeding 30 minutes (the normal cookie timeout for a visit). They are not very engaged, because most visits are over in the blink of an eye. This is probably what we would expect of a discovery site rather than a destination site, where the times are typically higher (more like 3 minutes). Obtaining directions (to content) and general fact finding can be undertaken relatively briefly so we should not be too surprised. In terms of the other engagement metric, page views, 58% look at just one page, less than 5% view more than 16 pages. Of course this comes with short visits. The site's character is changing with the introduction of virtual exhibitions, and when we look only at virtual exhibition use we see people dwelling longer and examining more pages.

Usage data can tell us much about informa-

tion-seeking behaviour, but nothing explicit about satisfaction. However, there are a number of metrics that provide a rough indication. First let us take repeat visits (Table 4). Mobile users appear to be much more likely to make fewer repeat visits to Europeana within a month. Thus 84% of them made just a single visit. This compares to a figure of 73% for non-mobile users. Relatedly, and not surprisingly, a very high proportion of mobile visits are new visits: 86% compared to 75% for non-mobile visits. However, these numbers need careful interpretation as mobile is growing so there are lots of new devices out there (people probably trade up to a new phone more often than they get a new computer; a phone is a status symbol a computer is not). So, there is a bias to 'new visits' in the case of mobiles simply because the device is likely to be new and not cluttered with lots of cookies from previous visits. To put it simply, the mobile returning visitor is more likely to be returning with a new phone next time. High new-visit figures might also be an artefact of accessing the service through different networks and the greater possibility of appearing as a new visitor.

There are another two metrics that we can look at and they both suggest that mobile users may not be obtaining the same outcomes as 'fixed' visitors. First, one-shot visits, where only a single page is viewed, are nearly twice as common for mobile users. It is not possible to tell whether this reflects a positive experience (they quickly got what they wanted) or a negative one (they got there by accident and weren't impressed or were in a hurry). There is also a big difference in click-through (to the originals in the libraries/museums) rates

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Table 4. Number of visits in a month for mobile v. non-mobile platforms (May–June 2013)

No. of visits in a month	Mobile visits (smartphones and tablets)	Non-mobile visits
1	52,258 (84%)	231,899 (73%)
2–3	6,810 (11%)	40,745 (13%)
4+	2,962 (5%)	44,957 (14%)

one-shot visits, where only a single page is viewed, are nearly twice as common for mobile users

– the Europeana equivalent of the full-text download. For fixed users, 44% of page views lead to a redirect to a content provider, but for mobile users, the click-through rate is just under 17%. One possible explanation here is that Europeana partner sites vary in how they are adapted for mobile browsers. If the user notices the first time that clicking through to the providers causes an error or leads to a badly laid out page, they are less likely to do so again. And/or it could, of course, be another indicator of fast and sloppy searching.

Key findings

Social media

Of course, social media and mobile phones go together and it is well worth examining the impact of having social media and more traditional Web searching juxtaposed, as it were, on the same platform, and a social platform at that. To place social media referrals in context it is worth first looking at all referrals. Seventy per cent of the 4.5 million visits to Europeana in the past year (2012) were search referrals, nearly all (97%) from Google – an amazing statistic demonstrating the sheer power of Google. By marked contrast, runner-up Bing, the Microsoft search engine, accounts for just 0.5%. Eighteen per cent of visits originate as links from other sites, 11% are direct – typed-in or bookmarked – and campaigns (newsletters etc.) contribute a little over 1%.

Google Analytics was not reporting social referral before Oct 2011, so we have a limited time series, which we have enhanced with log data. The limited data we have show that social media referrals start at around 1,000 per week and grew to 1,500 in January 2013. However, social referral only accounts for 1% of all visits to the site. In usage terms this is peanuts, roughly the amount of use advanced search gets in publishers' websites. Given the

sheer scale of social media activity and the perceived strategic value of social media to Europeana, this is surprising perhaps.

The dominant network is Facebook with nearly 30,000 referrals in the year since the 'new' portal launch in October 2011 (there has been another launch since, in March 2013). The 'average visit duration' of these Facebook-sourced visitors is just over 3 minutes. Although 'average' is a poor single metric to use in this context – the distribution being log-normal – the duration is slightly higher than the 2.5 minute average for all visitors, and thus provides some evidence that social media users might be stickier. Facebook was followed by WordPress with nearly 9,000 referrals, Blogger (over 4,200), Twitter (a relatively tiny score of nearly 3,300) and Netvibes (just over 2,000).

When we consider and compare the relatively stable autumn months (September–December, 2011 and 2012) the overall doubling of traffic on the site is not matched by a corresponding growth in social referrals year on year: Facebook (nearly 10,000 referrals, 2012) and Twitter (1,650 referrals) traffic in particular shows only a small 12% increase in visits. Only WordPress, with only a third of the flow from Facebook (3,037 referrals in 2012; 162% year-on-year growth) has kept pace with the overall pace of the site. However, Twitter is an interesting case because while there is little growth in referrals, dwell time has in fact doubled. The average for Twitter was 2.5 minutes in autumn 2011, but 5 minutes in 2012 – a possible sign that this community is becoming more engaged. Pinterest, a content-sharing service that allows members to 'pin' images, videos, and other objects to their pinboard, currently featured on the Europeana homepage, comes in at sixth in the social media ranking, with a very light traffic flow (681 visits September–December 2012). The high number of page views per visit from

seventy per cent of the 4.5 million visits to Europeana in the past year (2012) were search referrals, nearly all (97%) from Google

Pinterest (average 12) and very long dwell time (12 minutes) suggest ‘unreal user’ activity, which probably can be put down to internal development or testing activity.

Virtual exhibitions

There is lots of evidence to suggest that people prefer to view, rather than read, when they go online. In the case of Europeana, which is a multimedia platform, film and video are the most popular cultural objects, by some distance. Taking note of this, Europeana introduced virtual exhibitions in 2011 and they have been promoted prominently on the home page since then. They have proved an undoubted and a qualified success; they are popular, sticky, and generate high levels of engagement. The most recent figures show that the overall number of exhibition visits (just less than 50,000 for September–December 2012) although impressive for a quarter year, is still relatively low compared to the visits to the main site (1.6 million for this period). That is, just over 3% of all visitors find their way to an exhibition. But that is an unreasonable comparison; they are, after all, a relatively novel feature and 50,000 visits are significant when placed in contrast to the traffic flows associated with social media, for instance. September–December 2011 and 2012 data shows that there has been a 50% increase in visitors and ‘pages per visit’ has increased from 7 to 12 pages, the bounce rate is very low (0%) compared to the main site, so people appear to be dwelling; and we might have, at long last, that much sort-after stickiness. About 10% of exhibition visitors appear to be using a mobile (tablet) platform, which is relatively high.

Could there be lessons here for purveyors of text, such as publishers? Perhaps the content of their sites should be much more graphic, or maybe their journals should contain videos?

Conclusions

Four years ago Europeana was prescient in considering the mobile user in its development plans because mobiles are a now a very fast-growing market segment for Europeana and growing far faster than PCs. In fact mobile use grew 5-fold during 2012. However, it is tablets, rather than smartphones, that are making

the biggest splash. The iPad in particular has achieved a major breakthrough, making the tablet (big touch-screen, unencumbered by wires or peripheral devices) a popular platform where previous attempts have failed. It redefines the consumer ‘personal computer’ experience; in fact it is an ‘inter-web’ access-device rather than a computational machine. The ‘Pad’ has changed the way we need to conceive the ‘mobile’ user. Where once there was a clear difference between mobile and PC, the differentiation that is opening up is between office and personal. The office is the desktop and laptop, keyboard and mouse, work and study, documents and organization. The personal is pad and phone, touch-sensitive and wireless, conversation and affiliation, in a word mercurial.

Mobile (smartphone and tablet) use is personal use, and happens often in the evenings and on weekends; it occurs in the home or ‘anywhere but the office’. It is about consuming content not creating it. Social networking, courtesy of the mobile, may be creating contacts and networks but it is probably not building content as envisaged by those who suppose ‘content is king’ (typically publishers). In fact we can probably say that ‘conversation is king’.

Picking up on our fast food (information) analogy, mobile devices are providing the ultimate information take-away with all the evidence showing that we use them for information bite and snacking – more bouncing, more new visits, shorter visits and simple and less productive searching are a feature of their use. More seriously perhaps, mobile users are more promiscuous.

So if smartphones and tablets have already become, or are soon to become, a major platform for accessing the Web, will this also mean that they become the main platform for scholarly communication? We don’t actually know the answer to that and we shall have to wait and see, but logic would seem to suggest that this will indeed be the case. Given that mobile searching differs quite markedly from fixed/office/library-based searching, are publishers (and libraries) ringing the changes on their websites? A quick, non-scientific trawl around indicates that none really look like Europeana, which has been adapting for four years, or have its simplicity and visuals, but then maybe

the iPad in particular has achieved a major breakthrough

the aims, audiences, and content of the sites are different.

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References

1. The 'Google generation' is a popular phrase that refers to a generation of young people, born after 1993, that is growing up in a world dominated by the Internet
2. Rowlands, I., Nicholas, D., Williams, P., Huntington, P., Fieldhouse, M., Gunter, B., Withy, R., Jamali, H.R., Dobrowolski, T., and Tenopir, C. 2008. The Google generation: the information behaviour of the researcher of the future. *Aslib Proceedings*, 60(4): 290–310. <http://dx.doi.org/10.1108/00012530810887953>
3. Nicholas, D. and Rowlands, I. 2010. Virtual scholars: their characteristics and implications for librarians. *Link*, 11: 2–3.
4. Pew Internet. 2013. Smartphone ownership 2013. Available at <http://pewinternet.org/Reports/2013/Smartphone-Ownership-2013/Findings.aspx>
5. Pew Internet. 2013. Tablet ownership 2013. <http://pewinternet.org/Reports/2013/Tablet-Ownership-2013.aspx>
6. Eddy, N. 2013. Mobile Device Users Move to Tablets, Smartphones for Web Access: MWC. eWeek. Available at <http://www.eweek.com/mobile/mobile-device-users-move-to-tablets-smartphones-for-web-access-mwc/>
7. Srivastava, L. 2005. Mobile phones and the evolution of social behaviour. *Behaviour & Information Technology*, 24(2): 111–29. <http://dx.doi.org/10.1080/01449290512331321910>
8. www.digitalbuzzblog.com/2011-mobile-statistics-stats-facts-marketing-infographic/
9. www.europeana.eu/
10. CIBER. 2013. *Europeana 2012–2013: Usage and Performance Update Europeana 2012–2013: usage and performance update*. Available at <http://ciber-research.eu/>
11. Nicholas, D. and Clark, D. (2012) Evidence of user behaviour: deep log analysis. In M. Dobрева, A. O'Dwyer and P. Feliciati (eds), *User Studies for Digital Library Development*. London, Facet, pp. 85–94.

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