WHAT STATISTICS ON INTERNET TRAFFIC TEACH US ABOUT MOBILE DEVELOPMENT

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1. INSIGHT FROM DATA

The MOVR[1] report series confirms trends discussed in other surveys of the mobile Internet: overall supremacy of Android and iOS, the unstoppable rise of smartphones, market shares dominated by just a few popular brands. Further insights are gained by delving into the associated data set[2] made available by ScientiaMobile. The present document harnesses the detailed statistics from MOVR to provide operational criteria for guiding service development and testing, with a focus on mobile phones.

2. APP DEVELOPMENT

The MOVR dataset tabulates traffic from devices with an operating system allowing third-party native applications. After mapping each OS version to the date on which it was launched, we can answer the question "How up-to-date is the installed base of mobile software platforms in a specific region?" This information, crucial for app developers, is shown in figure 1 as cumulative distribution functions.

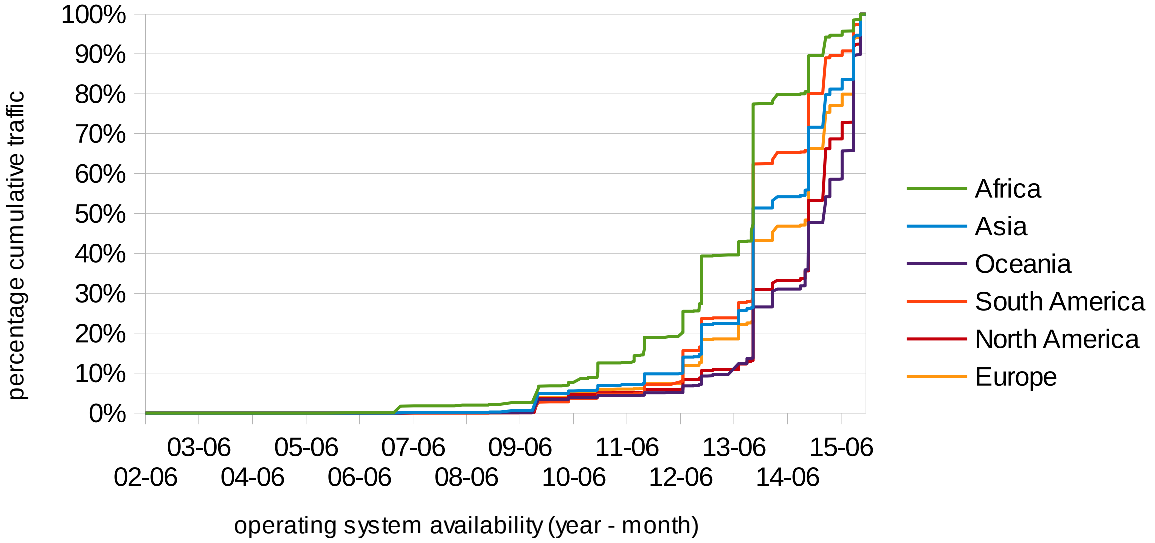

Figure 1: Cumulative traffic distribution relative to date of operating system availability.

1 See http://www.scientiamobile.com/page/movr-mobile-overview-report.
2 See http://data.wurfl.io/MOVR/data/2015_q4/MOVR_2015_q4_csv.zip for Q42015 statistics.

Let us assume that we want to provision an app-based universal service, i.e. one that runs on terminals representing at least 90% of the mobile Internet traffic. From table 1, we read out that 90% of transactions in Europe originate from devices running an OS version that is at most 3 years and 6 months old. In Africa, such a universal service would have to support all software platforms dating as far back as 5 years ago!

Differences within regions are also striking. Fast product renewal cycles promoted by operators show up in a median OS version of about one year in North America and Europe, even less in Oceania. However, the 90% quantile itself is a substantial multiple of that duration, signalling a skewed distribution with a long-tail of devices running old software reaching to early variants of Windows Mobile and Symbian.

The minimal sets of platform variants catering for 90% of the traffic are also listed in table 1. Clearly, in developing countries mobile phones are not fashionable gadgets replaced every year or so, but costly investments that people hold onto for as long as possible. In those low-income regions, developers must rely upon the mobile Web or even simpler technologies such as SMS to offer Internet services on mobile terminals. Apps are not a viable approach there – all the more so since the above statistics exclude traditional feature phones that are not app-capable. Even in wealthier countries, ensuring 90% market coverage implies supporting all iOS releases since version 7.0 (the latest one being 9.3 as of this writing) – overturning the established pattern of iPhone users swiftly migrating to an up-to-date Apple software platform.

	OS age (years)		OS versions covering 90% traffic			
Quantile	90%	50%	Android	Blackberry	iOS	Windows
Africa	5.1	2.2	2.3	7.0	7.1	8.0
Asia	3.6	2.2	4.0	–	7.1	8.1
Oceania	2.6	0.8	4.2	–	7.1	–
South America	3.6	2.2	4.0	–	8.3	–
North America	3.1	1.1	4.2	–	7.0	–
Europe	3.5	1.1	4.0	–	7.1	–

Table 1: Age quantiles (in years) of mobile operating systems in use, with corresponding baselines for the 90% traffic quantile for mobile phones.

Compared to the situation reported in the very first MOVR issue from 2Q2014, we observe that the OS requirement to achieve 90% coverage has barely budged in Africa, that in all other regions the Android baseline set at version 2.3 moved to 4.*, and that support for Windows is no longer necessary to attain the desired coverage in Oceania and Europe.

Crucially, those computed baselines are valid only for apps programmed long ago and minimally maintained ever since. An entirely new, or an upgraded app submitted to the Apple appstore during Summer 2015 had to be implemented with iOS 8 for certification. The impact of this policy constraint can be handled in two ways:

immediately maintaining the 90% coverage requires the introduction of Windows 8.1 and 8.0 into the OS mix of Europe and Oceania respectively, pushes the Android baseline back to 4.1 in North America, 2.3 in Asia and Oceania, and 2.2 in Africa. The alternative is to wait six months (Asia, Europe, Oceania) or one year (Africa, North America) while iOS users shift to version 9.*, progressively regaining the 0.6% to 3.9% market share (depending on the region) accruing to iOS 7.*.

The lesson is clear: to provision universal services, ensure a rapid market ramp-up and achieve a comprehensive coverage for a large variety of terminals over long product life-cycles, the mobile Web remains the tool of choice. Advanced games for top-of-the-line hardware, bespoke intranet clients, specialized e-commerce sites, or disposable promotional apps must satisfy very different requirements, and in such cases apps are justifiable. Nevertheless, supporting apps on software platforms launched several years ago may become untenable for small software houses. Many apps interact with a server to fulfil their function; even if the client software remains unaltered forever after it is released for a specific OS version, supporting it means keeping changes on the server backwards compatible: refactored server APIs, restructured data formats (including lexical properties and semantics of data fields), security protocols and cryptographic algorithms.

3. DEVICE TESTING

In a highly fragmented terminal landscape, validating the functionality and usability of an Internet service against enough end-user machines is a challenging task[3]. Once more, we analyse the statistics from MOVR to answer the question “How large and varied must be the pool of test devices to exercise a mobile Web site adequately?”

The MOVR dataset lists the ten smartphones and feature phones with the greatest presence on the mobile Web in each region, as well as their individual share of the traffic. Clearly, no reasonable number of individual models covers the 90% traffic quantile; instead, one selects a sample that is representative of the handset mix.

We construct a test pool by delimiting yearly periods – starting from 4Q2015 till 1Q2015, then 4Q2014 till 1Q2014, and so on – retaining, for each software platform (Windows, iOS, Blackberry, etc), the most popular terminal released during each such interval. In a second stage, we consolidate the samples drawn for each region into one global pool by choosing, for each period and platform, the model that achieved the greatest popularity in any region (rather than across all regions); this procedure promotes diversity by catching particularly successful regional best-sellers. The suggested samples reach back 4 to 6 years (and even longer in Africa) as shown in table 2; the global set was slightly adjusted to reduce redundancy.

The enduring domination by the iPhone and Galaxy ranges is expected, and the Asian predilection for phablets perceptible; fortunately, the sheer success of Motorola handsets in Latin America allows a departure from the otherwise overwhelming Samsung offering. After the Lumia 520 persistently held a place in the top ten since the very beginning, a Windows presence is now completely gone. The lack of continuity in model type and vintage from 2Q2014 to 4Q2015 regarding Symbian and Blackberry indicates that both platforms are on the cusp of disappearing from all top-

3 See http://www.smashingmagazine.com/2014/07/14/testing-and-responsive-web-design.

ten lists, most probably in 2016. The quartet of Nokia S40 phones provides the basis for testing interactions via numeric keypad, half-QWERTY keyboard, and touch-and-type mode – a relevant requirement for adaptive mobile Web sites that must cope with various input methods, not just different display resolutions and CSS versions.

Vendor	Global 2Q2014	Global 4Q2015	Africa	Asia	Oceania	South America	North America	Europe
Apple	5S 5 4S 4	6S 6 5S 5 4S iPod T 4	6 5S	6 5S 5	6S 6 5S 5 4S iPod T 4	6 5S	iPod T 6 6 5S 5 iPod T 4	6 5S 5 4S
HTC	Sensat.							
LG						L3		
Motorola	moto G	moto G2 moto G Droid			Droid	moto G2 moto G		
Nokia	L. 520 A. 311 C2-00 C1-01 C3-00 N8	A. 210 A. 201 X2-01 C3-00 E71	A. 210 A. 201 X2-01 C3-00 E71	A. 206 A. 203 X2-01 X2-00	A. 203	A. 302		A. 302 C3-00
RIM	Bold Curve	Z10 Torch	Z10				Torch	
Samsung	S4 S3 S	S5 Note 2 Y	J1 S5 S4 S3	S5 S4 Note 2 Y	S6 S5 S4 Y Duos Y	g. prime Y	S6 S5 S4 S3 Y	S6 S5 S4 S3 Y
Sony		PS Vita					PS Vita	

Table 2: Device test pools derived from top-ten usage statistics; a combined test pool is shown and compared to the one derived from figures for 2Q2014.

In practical terms, the global test pool is basically formed by procuring an annual average of three or four mobile phones, picked from the most used models according to MOVR statistics. All such devices over a 5 years time span constitute the *minimum* set for checking that a Web site operates correctly with the installed base of mobile phones – the indispensable hands-on, live verification that cannot be satisfactorily accomplished with emulators.

4. CONCLUDING REMARKS

Performing quality assurance with five years old devices that were “hot” in their time, or maintaining a generalist app on multiple operating systems across several years match the experience of veteran mobile developers. The novelty is that the statistical basis provided by MOVR enables us to determine exactly which OS versions to support, and which terminals to test with, instead of relying upon intuition; in other words, it allows evidence-based requirements planning during mobile development.

Of course, although quite rich, MOVR data are aggregated at the level of continents, hiding frequently stark disparities amongst geographically close countries. Thus, Wiko is a major vendor of low to mid-range smartphones in France – but has only a fledgling presence in neighbouring countries. Though economically and culturally quite close, Switzerland and Germany have quite different distributions of market shares relative to iOS and Android. What was extracted from published information and highlighted in the present article constitutes therefore a first step.

The long tail of handsets running outdated software entails a consequence: servers must do some heavy lifting for device detection and content adaptation. It is not a terrifically clever use of wireless bandwidth to download a Javascript framework onto a terminal only to ascertain that no amount of polyfills and DOM wizardry is going to turn a low-end smartphone from yesteryear into a device capable of interpreting custom tags, firing up service workers, and reacting to Web push notifications. Such situations are better handled by sending a Web page tailored for the target device right away. Combining client and server-side techniques is the appropriate approach to tackle device diversity, and this also means that traditional infrastructure such as device description repositories will continue to play a central role in mobile service delivery in the foreseeable future.

Finally, what about tablets? They do deserve an investigation – in a separate article.

REFERENCE

Eduardo Casais: *What statistics on Internet traffic teach us about mobile development*, technical paper, areppim AG, Köniz, Switzerland, 2016-04-14, 5 pages.

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This paper can be downloaded in PDF format from areppim.com at

http://areppim.com/b2evolution/usrblogs/technotes/?p=41

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Eduardo Casais has been working on Internet technologies since 1997. He has been involved in projects dealing with IP over ATM networks, WWW transcoders for TV set-top-boxes, and service platforms for telecom operators. He led the development of the WAP protocol stack and content adaptation facilities for the Nokia WAP Gateway, and has been an invited expert for mobile Web best practices at the W3C. He has patents on mobile applications and protocols to his credit and contributed to the WURFL device description repository. He currently works in Switzerland as a consultant in the area of mobile Web.

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