Open Device Lab:

an analysis of available devices in the gaming market.

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***Abstract* - Open Device Lab is a worldwide network of laboratories providing a community pool of internet connected devices. Quality assurance across real devices is needed to solve device-specific problems. The community proposal is to enable anyone a free-to-use lab to test their work. Building on the gaming market categories we carried out an analysis of community devices that can serve this market. Our goal is to evaluate their potential for collaboration by answering two questions: what are the recurrent types of devices for games that are using ODLs? which segments could they serve? Our findings indicate that the community presents a mostly mobile device profile, therefore it can serve mainly the mobile game segment. An important alternative to resolve device-specific problems and improve gaming experience.**

Keywords— Games market; Open Device labs; tests; games; devices

I. INTRODUCTION

The diversity of devices offered today in the market makes it more difficult when performing tests to solve device-specific problems. User reviews of game apps have been an important source of technology research. These data can help solve such important development issues to improve the user experience [1]. Based on this way we understand that there are two important steps; first we need to identify the devices that have problems and second we must have access to the identified devices.

The selection of devices depends on the markets for which the game will be developed. For example, if we consider global game market growth, the results by regions and segments are different. The forecast for North America is +15,7% CAGR in mobile phone, for Latin America +61.0% CAGR in tablet, for Middle East, Africa and Europe -22.0% CAGR in handheld and for Asia and Pacific +13.6% CAGR in MMO [3]. As for access to devices for testing and developing, the best choice can be using shared spaces. It is difficult and expensive to personally own a representative pool of test devices. For this reason, many companies or individuals cannot afford to purchase devices.

So we understand that the Open Device Lab community (ODL) is an important alternative for this issue. In a shared way, these spaces make it easier to keep a relevant pool of devices for regional or global market. Our research presents the results about ODL offering devices in relation to the game market. The analysis was carried out in two stages. The first stage used community global data from the overall sum of available devices and the second stage used localised data from countries with the highest number of laboratories.

II. SELECTION AND ACCESS DEVICES

There are several studies on mobile devices problems but we find a few that focus on games issues. The study that most contributes with our topic is by Kalid *et al.* [1]. They used user reviews to propose a method to select devices to test app games. This research found that most of the reviews (80%) originate from a small subset of devices (on average, 33%). These findings can contribute a lot with developers needs solving the first step, the selection. Our purpose complement with the second step, how access the devices.

One side of the research, methods and information offers choices about which devices should focus on testing. The otherside looks at the need to access these different devices. Kept in an individual collection, new models from top market share leaders come with a considerable cost. The reason for this is that they are generally more expensive.

The Open Device Lab community arose from the need to access the variety of real devices to perform specific tests. A collaborative idea to put together and share a collection of free access devices. Performing tests on specific devices can be an important factor to improve user experience. Therefore, promoting the sharing and collaborative idea could increase the global digital community [2].

The community was established in 2012, from the contact between technology professionals from Europe and the USA. Today Germany, the UK and the USA have the largest number of laboratories [2]. Furthermore, the largest Open Device Labs, by devices are:
@odlbmth / Bournemouth, UK with 441 devices, @sevenval / Berlin - Köln - Wien (Cologne) with 277 devices, @thedeveloperlab / London - UK with 265 devices, @html5test / Drachten, The Netherlands with 190 devices @cover_up / Bridgend - UK with 130 devices [6]. We can see that 4 of the 5 largest laboratories are located in the three countries with the highest number of ODLs.

On the websites of each laboratory we found that some of them make particular reference to lab testing game projects. Some of them not only have mobile phones, tablets, PCs and others but also have games consoles. For this reason, we believe that it would be important to explore the community's potential for the game testing market.

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III. Methodology

In this section we will describe the methods used in our study presenting the selection and collect data to make two stages of analysis. The main data used in our study is 3977 devices with game features from the Open Device Lab community.

A. Data selection

We conducted exploratory research to obtain data on the current games market and collected data regarding the number and types of devices that have the game feature from ODL. Today there are 157 laboratories registered on the community webpage. They are in 35 countries with 4391 devices accessible [13]. For the data collection we visited the webpages of each laboratory (website, Twitter, Facebook, GitHub and Google+). They are listed on the ODL community website, in order to find the list of devices available for testing in each laboratory. In some cases, we did not find the list and we contacted the lab by email, Twitter, Facebook or their website asking for the link of the device list. From the 31 laboratories where we did not find the list published we were able to contact 18, of which 10 answered. From these, 3 sent the list by email, 3 sent the requested link and the others did not provide the list. In addition, 13 labs had broken links or very old posts which were over a year old. Due to these reasons we did not find any form of contact which makes us believe that they are closed. We collected, organised and formatted lists in tables in order to identify the most recurrent models of devices with the games feature according to certain categories. After, we carried out two analyses: a) global - relating to all devices offered by the community in relation to the global games market b) partial - referring to the total labs collection of the countries with the highest number of laboratories. For this analysis we selected the top three: Germany, the UK and the USA in the context of their game markets.

B. Data collection

The data was collected between 16th and 19th March in 2016 in order to obtain updated lists. In total we obtained 3977 devices with the games features from 128 laboratories. We believe that because many links are outdated some lists could be too. Therefore, it is important to consider that new devices may have been purchased. Some labs published comments about requested devices that are not in the permanent list but can be obtained. As well as this, we found comments about older and broken devices. For this research we considered all listed devices with the exception of the broken devices.

C. Analysis categories

The categories used for data analysis is based on the game market. They can be categorised according to the segment: mobile, console, PC / MMO and web games [9] or per screen and market segment: entertainment screen (TV, consoles and VR), floating screen (tablets and handheld), personal screen ((smart)phone and watches), computer screen (web games and PC/MMO games) [5]. Based on these categories we conducted data collection by type of devices for games found in ODL community.

IV. Results and Comparison

The following are the results of global and partial analyses. First, the total devices available for games, worldwide, in the Open Device Lab community related to the games of the global market data. The 3977 devices represent 128 laboratories from 30 countries. The number of devices is less than the total available in the community because it is only related to the selected game market, as described in the previous categories. Additionally, the number of laboratories is less than the total registered because as we explained previously we did not have access to all lists. In the second phase we analysed the regional data from Germany, the UK and the USA in relation to their game markets. These are the countries with the highest number of registered laboratories and together represent 72.46% of the devices available in the community according to the segments of the game market.

A. Global analysis results

Among four segments: console, PC/MMO, web games and mobile, the latter is by far the fastest growing segment in the gaming industry. It is the largest segment in terms of number of gamers and will become the largest segment in terms of revenue by 2017 [9]. Mobile segment represents 96.75% of the devices available in the community Open Device Lab, Fig. 1.

In the console segment, the most sales in the current generation between 2008 and 2015, were Sony PlayStation 3, Sony PlayStation 4, Sony PSP, Sony PlayStation Vita, Xbox 360, Xbox One, Nintendo Wii, Nintendo Wii U, Nintendo DS, Nintendo 3DS [4]. Among the total number of data collected 1.52% are consoles and of these 86.4% are equivalent to the same best-selling devices in the global market by 2015, Fig. 1.

PC / MMO segment will reach $ 29.2 million in 2016 and is expected to become the largest single game segment [8]. The percentage of PC / MMO devices is 1.73% in the ODL community, Fig. 1.

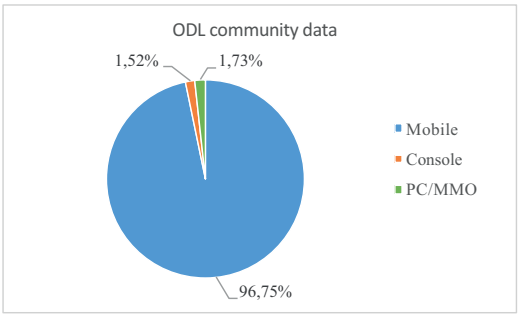

Fig. 1. Percentage data of devices in ODL community by game segment.

We now present data analysis according to screens and market segment divided into four major categories already presented in detail in the methodology. In this scenario, the revenue forecast for the game market in billions for 2017 is a total of 102.9 billion dollars. Therefore, we have 40% on computer screens, 24% entertainment screens, 22% personal screens and 14% of floating screens [3].

From data collection according to the same categories, we obtained the sum of the ODLs device lists which present two main categories. First 69.95% from personal screen, second

25.62% from floating screen and with much smaller percentages 2.74% from entertainment screen and 1.68% from computer screen, Fig. 2.

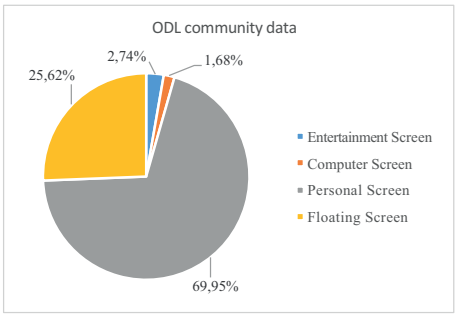

Fig. 2. Percentage data of devices in ODL community by screen and game segment.

We observed that in terms of the division only by segment or in combination with the screens, devices offered in the community are most mobile. They largely correspond to the (smart)phones followed by tablets. These relate to the game market's demand of the mobile game segment which has been forecast as the largest in gamers and revenue for 2017.

B. Partial analysis results

The USA which has 26 labs registered and the world's largest games market by 2014 had 26% of the global market in 2015. In the same year they had $22.0Bn in revenue, 200,374,000 gamers e +3% YoY (year-on-year). Germany with 27 labs registered and United Kingdom with 26 are included in the game market delimited by Europe, The Middle-East and Africa that combined made 20.5Bn in revenue, 605,442,000 gamers and + 5% YoY corresponding 22% of global market. In addition, 4% are from Latin America and 47% from Asia and Pacific of those 23% are from China [5].

Germany – is the biggest games market in Europe and fifth largest in the world. A large part of the amounts spent on games is concentrated on the console segment. (Mid)Core PC are very popular in the country and represents over a quarter of gaming revenues [11]. The ODL community here has the largest number of laboratories. In terms of devices per segment and screen has 73.65% of personal screen, 22.40% of floating screens, 2.01% of computer screen and 1.93% of entertainment screen, Fig. 3.

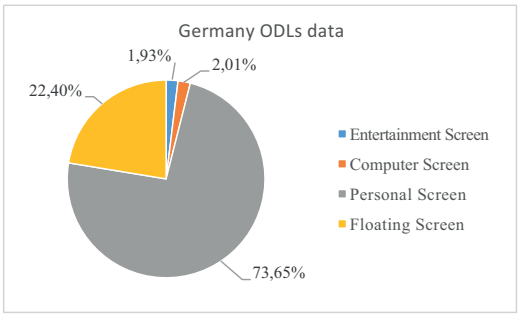

Fig. 3. Percentage data of devices in Germany ODLs by screen and game segment.

The United Kingdom – is the sixth country in the world ranking by revenue in 2015 [12]. In segments and gamers 25% play on consoles, 25% on computers, 22% on smartphones, 17% on de tablets and 10% on handhelds in Q2 of 2015 [7]. The UK has the second highest of ODL with 26 labs registered, which is as many as the USA. The data results show 69.10% of personal screen, 26.78% of floating screen, 2.29% of computer screen and 1.83% of entertainment screen, Fig. 4.

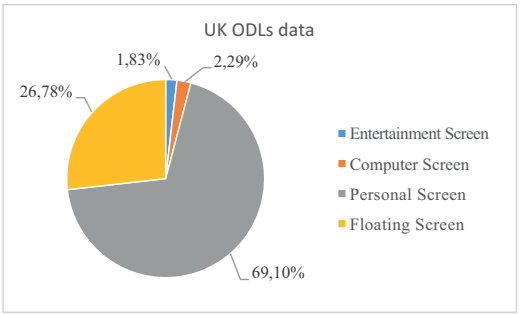

Fig. 4. Percentage data of devices in the United Kingdom ODLs by screen and game segment.

The USA – in 2015, the country dropped to second place in the world game ranking behind China, with revenues of US$ 22.0 billion. This was an increase of 4% from 2014, when the USA was still number one in games market [10]. On segment markets 45% are entertainment screens, 24% are computer screens, 16% are personal screens and 15% are floating screens [10]. In ODLs lists we found 68.56% on personal screens, 25.41% on floating screens, 3.11% on computer screen and 2.93% on entertainment screens, Fig. 5

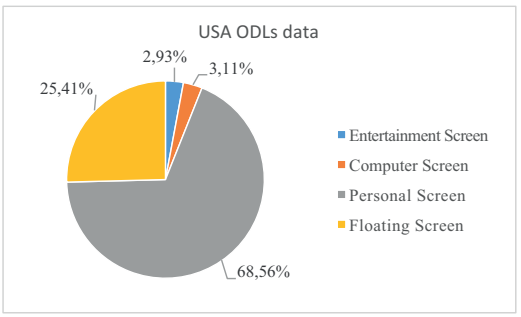

Fig. 5. Percentage data of devices in the United States of America ODLs by screen and game segment.

If we compare the data collection of the three countries, we are able to see that even with differences they have the highest percentage of personal screen devices. The UK and the USA are close, with 26,78% and 25,41% of floating screens followed by Germany with 22.40%. Furthermore, in categories with a smaller representation, computer screens have a higher percentage relative to the entertainment screen.

Individually, Germany has an important share of their market in consoles and PCs. We can find in their laboratories more handhelds than PCs. The UK has the majority of consoles players, PCs and smartphones. We are able to find in their labs a big collection of personal devices and floating screens that well would meet the mobile demand and the market share of handheld consoles.

The USA with their higher entertainment and PC screen market has an underserved small percentage in their laboratories. Already in their lower demand for personal and floating screens it would be well served with the highest percentage of available devices.

V. Conclusion

The Open Device Lab community is recent, created in 2012. Presently we are researching and so far have observed that the community as a global network presents a mostly mobile device profile, therefore it can serve mainly the mobile game segment.

In this short paper, from the data obtained, although with one based on the gaming market category, it seems to turn more to the overall market for mobile development. The actual collection is a good option for the development of the game market. They could serve mainly mobile games segment followed by console and PC. In addition to being the largest in number of gamers it has great growth forecast in the mobile segment.

We can not conclude that ODLs are focused on the game sector since most laboratories do not make reference to games on their websites and have few specific devices for testing. The recurrent types of devices for games are as follows: mobile phone, tablet, PC, console, TV, Handheld, VR and watch.

Moreover, we can see that the mobile games market is the fastest growing and therefore enabled mobile devices are important for the overall mobile industry including games. Consoles today are a small percentage of the ODL total devices, but most of them are on the lists of the most-sold in the global games market.

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