Usability and user experience methodologies used by games companies

CATALONIA RESEARCH PROJECT - REPORT

**Observatory of Communication, Games and Entertainment
Institute of Communication**
Autonomous University of Barcelona
University of Vic-Central University of Catalonia

Founding Partners

incom-uab.net/ocve

ocve@incom-uab.net

Introduction

The goal for any game development is to have a game that is fun to play, entertaining, that provides surprises, enables gamers to be challenged and apply their skills. In order to achieve this objective, there is a broad variety of game evaluation methods currently available that help game designers, developers, practitioners and users, themselves that start to design and develop games. User experience evaluations in games and more general in interactive entertainment systems have been performed from early on in game development. Developers and users started to develop their games and simply tried them out themselves to see if they were good and fun.

These research project was launched to provide scientific knowledge on a specific field: Usability and user experience methodologies. We focus on Catalonia, Spain. The Catalan video game industry is one of the most dynamic sectors, positioning itself as the driving force for the local economy.

This text is an introduction to the study led by the Observatory of Communication, Games and Entertainment. This study investigates the design methodologies of the game companies, and the extent to which the game companies utilize usability and user experience (UX) methods, and the methods they use. The respondents were professionals with different roles in game development. Game companies used multitude of design methods, some of those mentioned are: Playtesting, where potential users are made to play and both their quantitative data (time taken to complete a task, places where they get stuck or pass through too quickly, etc.) and qualitative data (emotional reactions, comments, engagement, etc.) are observed. Heuristic evaluations are also carried out when an expert analyses the game's ease of use. There is also A/B testing, in which design variations are launched to see which what the result of better retention and monetization will be.

We used the word "user experience", or UX, as a synonym for player experience or gamer experience. The term "user experience" was only rarely used in the games industry, but according to Melissa A. Federoff, it became extremely prominent in the field of HCI. The fields of HCI, usability and game research are starting to gain from each other. Firstly, user experience evaluation methods from HCI are used during the game development to improve user experience, secondly, HCI is investigating conditions of the gaming experience (fun, immersion,flow) to understand the concept of user experience and apply it. And during the various development phases there is a set of Usability/UX evaluation methods that can be applied.

This project started on the 1st of September 2016 and ended on the 30th of July 2017. Utilizing both quantitative and qualitative research methodologies, the project goal was to provide new knowledge and understand how do game companies evaluate the gamer

experience. The report summarizes the project results, which have been previously disseminated in "The White Book of Catalan Video Game Development 2017", "The White Book of Spanish Video Game Development 2017", and in "*Informe de la comunicació a Catalunya, 2015-2016*". In addition have been propagated in web sites, seminars and in academic conferences and journal publications.

This report is structured into three different sections. The first section shows how the videogame sector in Catalonia is undergoing sustained growth. The second section presents a overview on definitions of usability and user experience, followed by some basic terms that are currently used in the games industry. The third section shows a brief overview of the study design methodologies of the game companies, and the extent to which the game companies utilize UX and Usability methods, and the methods they use. Finally, in the fourth section documents related to the work of the research team are showed. We hope you find this research report interesting.

A research should present new research questions, and we believe that we have accomplished in this and that these results will be interesting for the academic community and game industry alike.

We thank our research partners, the Spanish Association of Entertainment Software and Video Game Development and Production Companies (DEV) and *Institut Català de les Empreses Culturals* (ICEC) helping us carry out this research. In addition, we give special thanks to all our co-authors, informants, survey respondents, interviewees and colleagues for making this research possible. Lastly, we thank Institut de la Comunicació (INCOM) at the Autonomous University of Barcelona (UAB) and the University of Vic-Central University of Catalonia for their help with the promotion of this studies.

Ruth S. Contreras Espinosa
Scientific Leader

Section I

Game development in Catalonia

Ruth S. Contreras and Xavier Ribes

As noted by Cubeles (2015), in *Informe de la comunicació a Catalunya* [1], during the 2011-2012 period, the videogame industry underwent a serious loss of sales in the Spanish internal market (-16, 04%). Despite this, thanks to the inclusion of online income statements in 2013, this trend turned upside down (13,38%). The increase of equipment sold in 2014 (8,31%), which continued on the up in 2015 (12,02%), together with the growth of online sales (21,16%) has allowed the overall revenue of the videogame industry in Spain to continue growing for the third consecutive year, despite the ongoing fall in videogame sales in physical media (-9.23% in 2014, -3.30% in 2015).

The sales of equipment and physical videogames during 2015 was around 791 million Euros in the Spanish market (GFK data, quoted in AEVI Spanish Association of Videogames, 2015). On the other hand, sales of online videogames registered 292 million Euros (data from GameTrack, quoted in AEVI, 2015). Therefore, in total the Spanish videogame market moved 1,083 million Euros in 2015. Bearing in mind that the number reached in 2014 was 996 million Euros, this is a 8.73% increase. See table 1.

Table 1. Evolution of internal videogame market in Spain (2011-2015) in millions of Euros.

	2011	2012	2013	2014	2015
Software sales (physical sales)					
PC Games	29	31	20	18	15
Console Games	470	397	381	346	337
Total	499	428	401	364	352
Hardware sales					
Console	373	297	275	301	334
Periferics	107	97	86	90	104
Total	480	394	361	391	438
Total					
Software and hardware sales	979	822	762	755	791
Online sales			170	241	292
Total	**979**	**822**	**932**	**996**	**1.083**

Source: Compiled from AEVI sources (2014 and 2015).

---

[1] See https://culturadigitaldotblogdotgencatdotcat.files.wordpress.com/2016/02/pla-digital-definitiu.pdf

Obviously, a lot of factors are involved in the market and it would be too simplistic to explain the growth using only one variable. Even so, we can underline that online sales are one of the engines that have helped to break the downward trend that had been going on since 2013 (surely thanks to the influence of fewer physical sales) and that have also helped economic growth that, even in 2014, had returned to 2011 numbers and, in 2015 had outstripped them. See Graph 1.

Graph 1. Evolution of videogame sales in Spain (2011-2015) in millions of Euros.
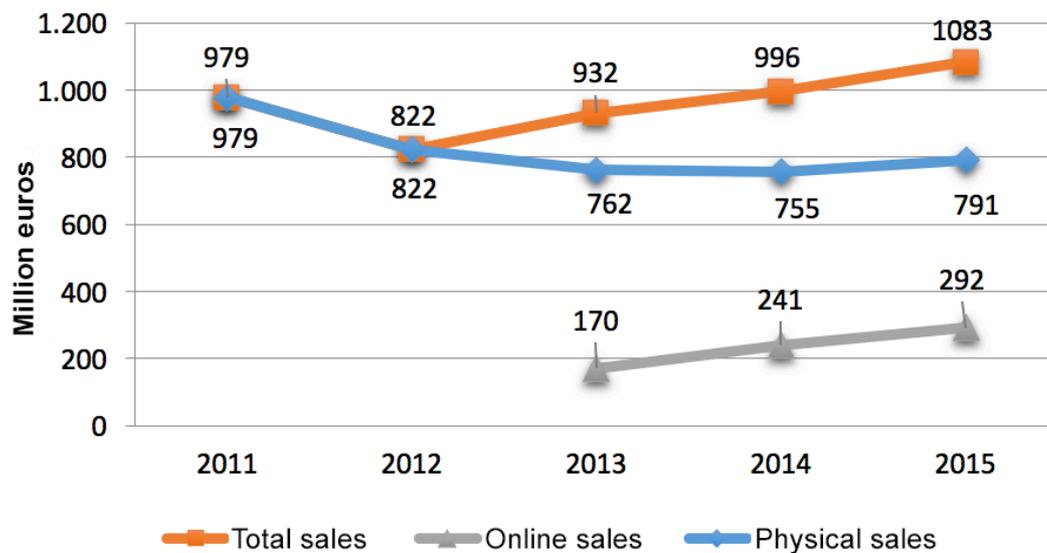
Source: Compiled from AEVI data (2014 and 2015).

On the 31st of March 2014 the Generalitat de Catalunya's Department of Culture, *Institut Català de les Empreses Culturals* (ICEC) presented the Digital Culture Plan 2014-2016[2], with the aim of strengthening Catalan cultural and creative businesses. This plan seeks to take action in three areas, one of which being local digital companies, where we would find the videogame sector.

---

[2] See www.webcitation.org/6rML4YFO6

The main lines of action to be taken for digital businesses are the creation of a finance programme with a new line of participatory loans for young digital businesses to the value of 1.5 million Euros. A programme of internationalisation will help to broadcast Catalan creation and productivity, and a communications programme will help to give visibility to the sector's businesses in specialised media. There is also a programme to encourage digital businesses to become suppliers for third-party services, a programme to avoid talent drain by improving relationships between students and business, as well as attracting foreign companies. In addition to these specific actions for the digital industries, a series of cross-industry measures have been designed that may also benefit the sector, such as the promotion of university and business relations, supporting the organisation of events that bring together digital and cultural content or the improvement of Catalan business skills via training.

According to ICEC data (2011-2016), in Catalonia the videogame sector is in a moment of strong expansion, both in terms of the creation of related businesses and in hiring potential. This means that, year on year, revenue quantities are growing. See Graph 2.

Graph 2. Evolution of the videogame sector in Catalonia (revenue, companies and workers, 2011-2015).
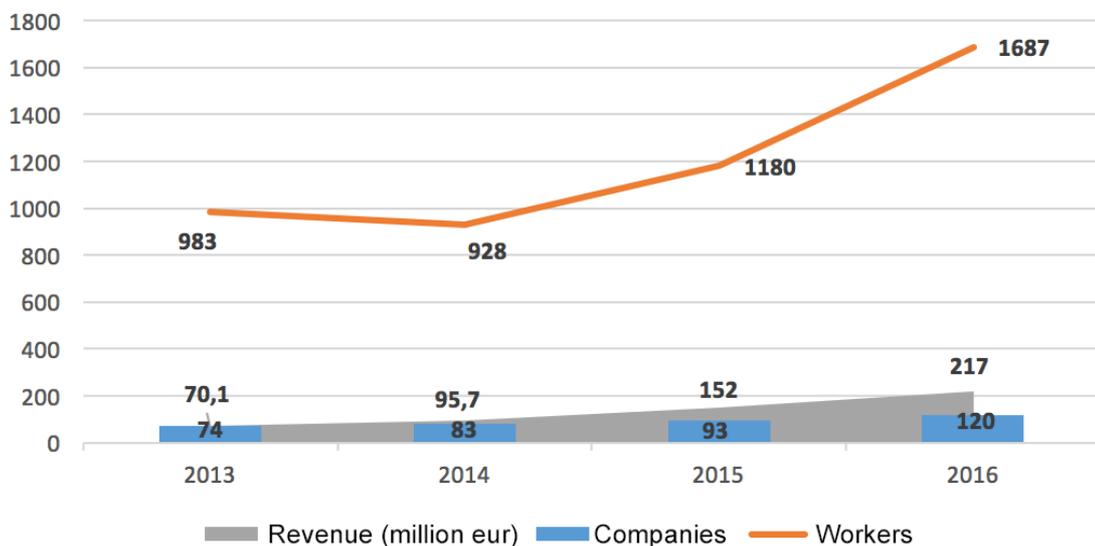
Source: Compliled with ICEC data (2012-2016).

Therefore, from 2013-2014, the number of companies dedicated to creating videogames in Catalonia grew by 12.16%; in the following period, 2014-2015, growth was similar (12,05%); interannual growth from 2015 to 2016 was 29,03%. On the other hand, despite a fall registered in 2014 of 55 people (-5.59%), the number of Catalan workers in the sector has grown from 2014, from 928 to 1180

in 2015 (27.15%) and reaching 1687 in 2016, a 42,97% growth from the previous period. Revenue data also has followed the sector's expansion, which has gone from €70.1m in 2013 to €97.7m in 2014 (36.52%). Similarly, in 2015 the figure has reached €152m, i.e. a percentage increase of 58.83%, and in 2016 a total of €217m, a 42.76% increase.

For their part, the DEV (2016) notes that videogame development companies located in Catalonia billed €214.5m, 42% of the Spanish total. So, Catalonia, together with the Madrid region, co-lead the market with similar figures. In the Madrid region we can find 26.2% of the 480 active videogame companies and of the 125 business projects, 24.8% of them are located in Catalonia. In terms of numbers of jobs, Catalonia leads the nation, with 38% of videogame professionals, followed by the Madrid region, which covers 28%. Production in Catalonia has remained largely specialised in games for iOS and Android mobile devices, which are by and large smaller in terms of development and less costly than for other platforms (see image 1). In this context, we have to note the importance of certain multinationals like King and Ubisoft for their locating digital game creation and development centres in Catalonia. According to a study published in 2016 by SuperData Research,[3] mobile games have generated $41bn profits, surpassing other platforms.

Graph 3. Development by platform / operating system in Catalonia.
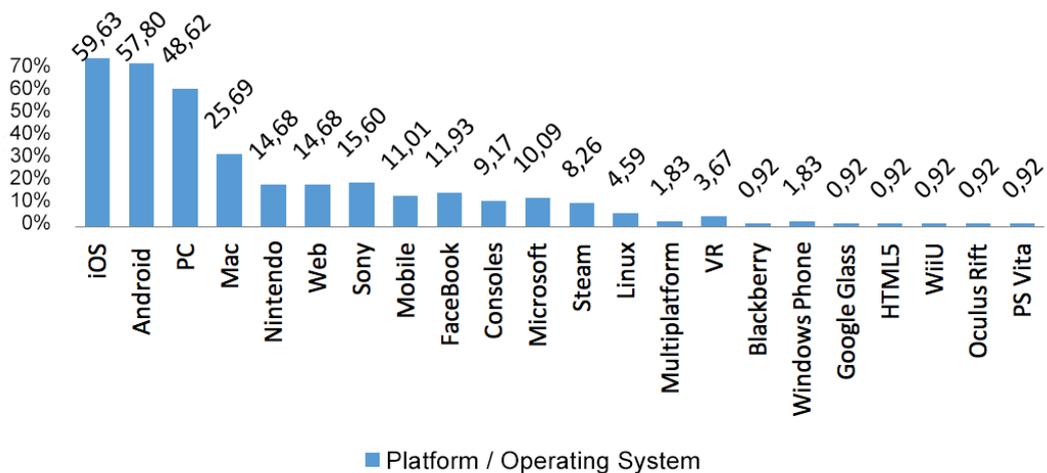
Source: Chart compiled according to the datafrom the OCVE.

Catalan in videogames

According to the 'Status of videogames and computer games on the market in Catalan' report, created by the Plataforma per la Llengua (Platform for Language, 2015), the percentage of games in Catalan is 9%, far behind English (100%) and

---

[3] https://www.superdataresearch.com/market-data/market-brief-year-in-review/

Spanish (with a rate of 93%). This study also criticised the fact that despite 12 universities in Catalonia and 3 centres in Valencia teaching studies related to videogame creation, Catalan is only present at undergraduate level, but not at postgraduate level. This leads of a lack of specific vocabulary that 'tends to turn into low levels of later usage'. The number of Catalan-language games available on the market in 2014 was 10 for computer, 3 for consoles, 83 for iOS devices and 64 for Android.

Table 2. List of 10 games in Catalan for computer.

Game	Game Company
Rust	Facepunch Studios
Unepic	Francisco Téllez (independent)
Nihilumbra	Beautifun Games
Steamroll	Aticto Estudi Binari
Regnes Renaixents	Celsius
Battle of Wesnoth	Comunitat lliure
Butinet	Butijocs, SL
Hattrick	Hattrick Ltd.
LinCity	Lincity-NG
X Moto	X Moto

Source: Compiled with data from the *Plataforma per la Llengua* (2015).

Table 3. List of 3 games in Catalan for consoles.

Game	Platform	Game Company
Wii Sports Connection	Wii	Ubisoft
Minecraft	PS4, Wii U, xBox One, PC, mòbil	Mojang
Les aventures de Tintín	PS3, Wii, xBox 360, PC, mòbil	Ubisoft

Source: Compiled with data from the *Plataforma per la Llengua* (2015).

None of the videogames in the top 10 positions in sales are available in Catalan. The game with the best sales position that has Catalan as an option is Minecraft, in the 12th position. There is also no production in the 10 ten most-played games: Rust takes the 13th position on the Steam platform.

As described by graph 4, the DEV (2016) reports that in videogames developed in Spain, Catalan is present in 15%, behind English (97%), Spanish (95%), French (18%) and German (16%). However, it beats other languages like Italian (14%), Russian (11%), Chinese (9%) or Portuguese (8%). The consumption of Catalan-language videogames in Catalonia has remained very low (less than 2%), a situation that can be explained by the weak supply of content in the language.

Graph 4. Language in videogames (2015)
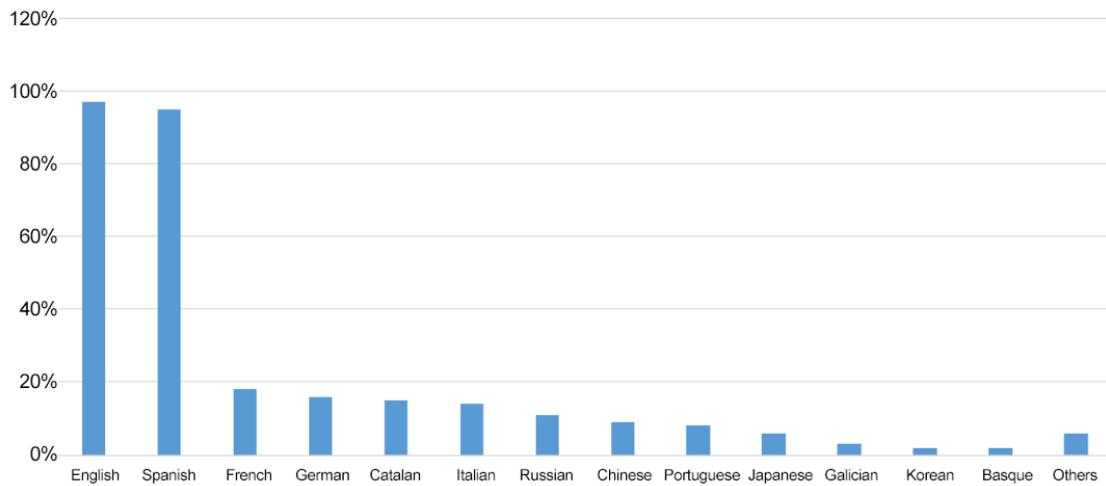
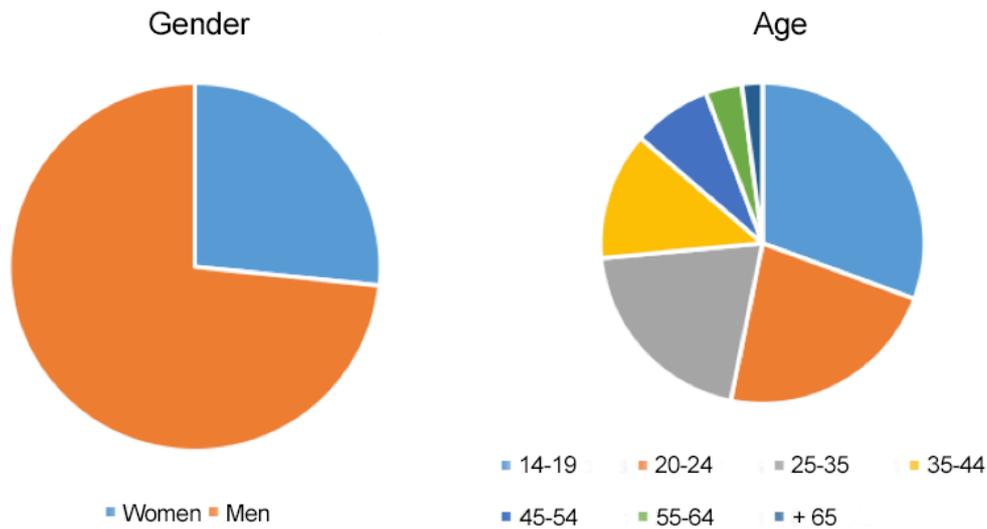Source: Own source compiled from DEV 2016 data.

Amongst the Catalan population in 2015 the ICEC data[4] shows that 21.8% of the total population play games. Out of the total games, the percentages can be divided so, 73.37% men and 26.63% women. Of 100% of players, 30.63% are gamers aged 14 to 19 years old, followed by 22.5% of users between 20 and 24 years; in third place, we find fans between 25 and 35 years of age, with 20.33%; with fourth place taken by gamers 35 to 44 years old, with 12.88%. Further back, with 7.91% and 3.62% are the older players, with ages of 45 to 54 and 55 to 64 years respectively. Users older than 65 years of age are in last place, with 2.06%. This 21.8% of gamers could encourage a larger number of games in Catalan. See Graph 5.

Territorial distribution

In terms of ICEC data, the Observatory of Communication, Videogames and Entertainment (OCVE), compiled and updated the data on videogame companies and indie producers located in Catalonia in 2016. Of the 112 references, data from 99 companies and producers distributed throughout Catalonia was collected. The province of Barcelona, and especially the capital, is home to 90.1% of these producers. Barcelona, with 67.7%, is an important production centre and a beacon for national and foreign companies.

---

[4] http://dadesculturals.gencat.cat/web/.content/sscc/gt/arxius_gt/Estad-culturals-Catalunya-2016.pdf

Graph 5. Gender and age of Catalan gamers 2015.

Gender

Age

■ Women ■ Men

■ 14-19   ■ 20-24   ■ 25-35   ■ 35-44

■ 45-54   ■ 55-64   ■ + 65

Source: Own source compiled with data from the ICEC 2016. Cultural participation survey in Catalonia 2015.

The second city in number of companies and producers related to videogames is Sant Cugat del Vallès, with 5.1% of the total. The presence of sector companies and entrepreneurs in the other Catalan provinces is essential testimonial. So, in the province of Lleida we can find 5%, while Tarragona and Girona are home to 2% and 1,1% respectively. See the map[5].

As described by graph 6, the distribution in terms of age is relatively homogenous. New initiatives, less than 2 years old, make up 28.1% of the sector. The largest number (29.7%) is formed of companied between 2 and 4 years old. 18.8% are between 4 and 6 years old. Finally, companies that have operated in the sector for more than 6 years make up 23.4%.

More data that can used is the presence these companies have on the Internet. As might be guessed, practically the entirety of these companies have a web site (99.1)%. The use of social media, however, is not universal: 89% are on Twitter and 87.2% are on Facebook. Just over half (53.2%) have a profile on YouTube and only 29.4% use LinkedIn relations. Google+ and Instagram (both with 13.8%) stay above 10%. None of the other networks noted, Tumblr, Pinterest and Dribble go over 4% of use. See Graph 7.
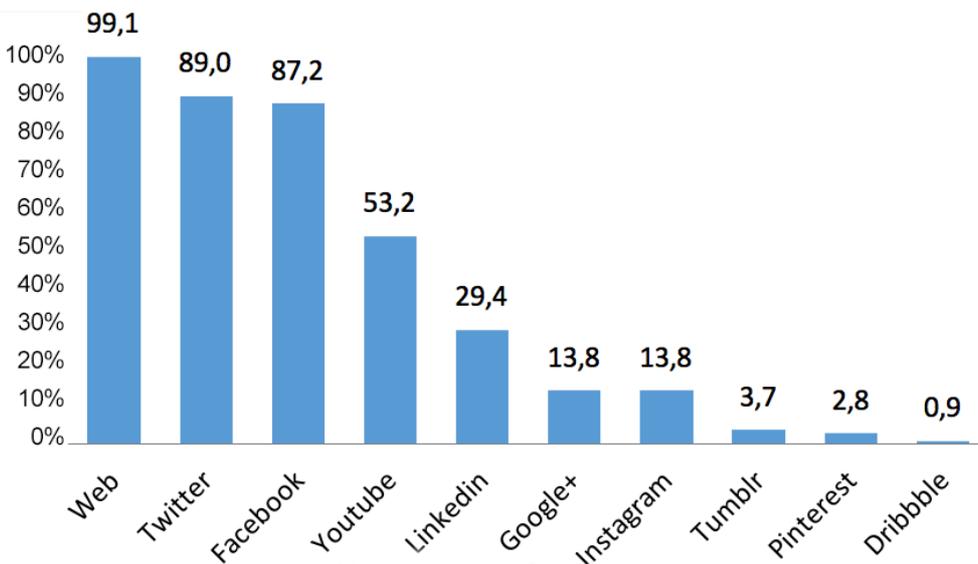
---

[5] See http://goo.gl/IyymDj

Graph 6. Age of videogame companies and indie producers in Catalonia.
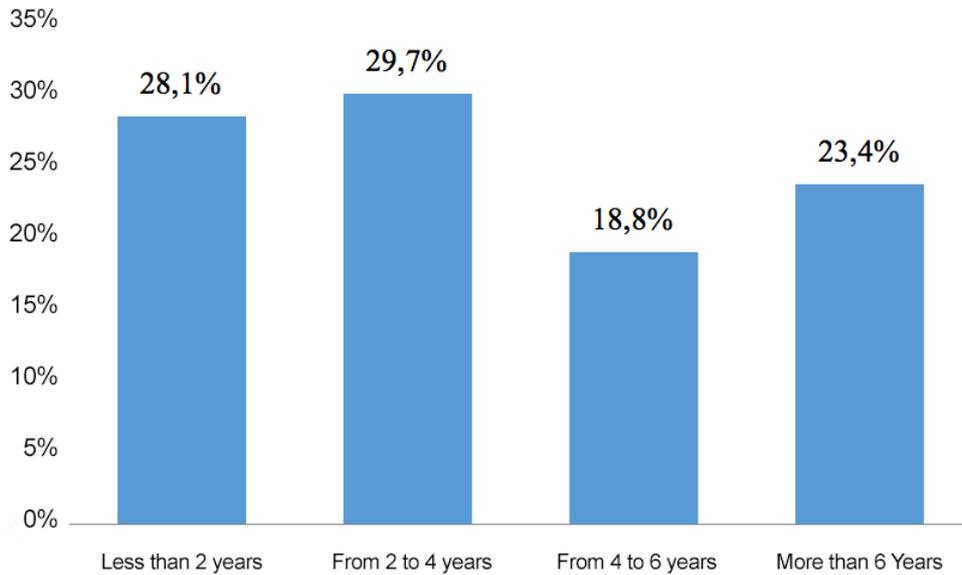
Source: Own compiled using data collected by the OCVE.

Graph 7. Internet presence of videogame companies and indie producers in Catalonia.

Source: Own compiled using data collected by the OCVE.

Section II

Usability and user experience

Ruth S. Contreras

Usability means making products and systems easier to use, and matching them more closely to user needs and requirements. The international standard, ISO 9241-11, provides guidance on usability and defines it as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

Usability methods have been directly applied to games, but we need specific methods. For example, Nielsen's usability heuristics have served as guidelines for creating usable applications. Each aspect of usability heuristics, as described by the ISO, is measured independently. But researchers like Laitinen (2006) have constructed sets of heuristics which are specific to games and these heuristics can be useful during the first stage of game development.

Furthermore, the term user experience can be seen as an general concept used to stimulate research in HCI to focus on aspects which are beyond usability and its task-oriented instrumental values (Hassenzahl 2003). The ISO definition on user experience, ISO 9241 -210, focuses on a user's perception and the responses resulting from the use of a product, system, or service. From a psychological perspective, the responses are actively generated in a psychological evaluation process, and it has to be decided which concepts can best represent the psychological compartments to allow to measure the characteristics of user experience.

So, UX evaluation can be different to traditional usability evaluation. Based on the typical game development phases, some authors describe UX evaluation is performed in the games industry including focus groups, play testing, interviews and Observation.

Section III

Usability and user experience methodologies used by games companies in Catalonia

Ruth S. Contreras, Emiliano Labrador, Eva Villegas, Ignasi Coll and Jose Luis Eguia

The evolution of game design has been historically based on processes that made the end user part of the design in very few stages. In more recent history there has been a paradigm shift thanks to a confluence of various disciplines, characterised by a philosophy that makes the user the central focus of the design process.

The games industry is growing globally, and this is linked to a growth in players which has come about thanks to factors such as a larger player age range or the incorporation of a female audience on a massive scale. This has caused demands on game design to grow by needing to satisfy an audience with varying tastes as well as differing motivations or time available to play. Traditionally the user has been incorporated as part of the design in advanced development stages, either as part of a play test of other evaluation techniques. However, user opinion is more and more taken into account in earlier stages of the design process, although User Centeered Design (UCD) is still not being applied with any rigour. Speaking to the potential user from the outset of the development and evaluation their perceptions is part of the design process (investigation/prerequisites, design, evaluation, product revision, design, evaluation and so on) whose aim is to ensure a satisfactory user experience.

The lack of professionals dedicated to incorporating UX into their companies forces other profiles to take on these functions without being able to dedicate the necessary time to it and without applying possibly more appropriate methods thanks to a lack of knowledge or time. The most commonly-used method used in Catalonia is playtesting, used in almost all companies, and the second most commonly-used method is 'observation'. Other techniques used are focus groups, task-based tests with users (in some cases recorded by third parties) or heuristic analysis largely focussed on usability.

Most game companies measures games towards the end of the development life cycle, especially small companies. Although this may be suitable for fixing small changes on time, it is not sufficient for altering key game mechanics. If new

techniques are to be designed which can evaluate a game during its development cycle as well as the final product, then a better understanding of the game life cycle needs to be obtained.

Companies based in Catalonia also make it clear that they take into account various methodologies and apply them at various development phases. However, it remains clear that they are doing so without knowing full well the method or the definition of all of them and the differences there may be between them. For example, they mention carrying out interviews with several gamers when in fact they are referring to using focus groups. We have to remember that, far beyond a trend, usability and UX methodologies are based on UCD and are perfectly defined ISO standards. Training in these methodologies has been incorporated into degree and postgraduate studies over the last few years, and as such is a discipline that has been integraded into companies relatively recently in comparison to other profiles.

A majority of professionals also tend to confuse the terms usability and user experience. Definitions can be divided into two groups: the first one sees usability in a more traditional way where the aim is to evaluate the interface, controls and other methods of game interaction. The second group sees usability as a broader concept including game mechanics together with the interface and includes concepts such as 'fun', user experience and emotions linked to the concept of playability.

Another point to note is that these techniques are carried out by profiles such as the editor, designer, artist or the programmer, both in the creation and execution of the test, data collection and analysis. Most game companies does not have a quality assurance (QA) group or someone who are responsible for testing the game, especially small companies. So, this is done on a personal basis and the information obtained is often reduced and biased. The majority of the reasons mentioned by companies to not carry out activities related to usability or UX evaluation largely refer to a lack of experience or resources. However, the majority of these companies are interested in applying various usability and UX methodologies in the future. After speaking to the companies, and talking about the various methodologies that exist, there is also a feeling of a growing sensitivity to these topics and the majority coincide in positively evaluting user involvement during the development process.

Data as part of design

During development phases there is a set of usability and UX evaluation methods that can be applied. In general in Catalonia, 40 companies largely follow the same game production phases. These are as follows: Conception-Design-

Implementation-Testing-Maintenance. As we can see, there is a specific phase (mentioned by the respondents) designed for testing where the user is involvement to a greater extent, but this involvement is starting to appear in previous processes. So, the game companies measures games towards the end of the development life cycle.

Conception can be initiated either from the client, publisher, who provides finance, or the development studio, who are responsible for the production of the game (Concept design phase). In Pre-Production, following design approval, the team enters an important phase, during which time fundamental game mechanics are proven and problematic areas are identified. The purpose of this phase is to try out ideas quickly without getting bogged down in issues of final presentation quality, to identify risks and prove the important aspects of the game concept. So, this is where a prototype comes into its own. Prototyping serves to provide specifications, examples of features (physics, menus and vehicle handling) or could be technical demos or other components of the game or graphics engine. Different aspects of the game may be prototyped simultaneously or independently (Design phase).

During the production phase, the team will spend time producing levels, characters, front end menus and other components of the game. In addition to the core team (programmers, designers, artists, etc.), too include a quality assurance (QA) group or someone who are responsible for testing the game, focusing on finding technical errors in the game code and ensuring smooth execution of the game on a technical level. They expect to found to functional bugs and identify playability issues which are discussed with the rest of the development team. Sometimes, the team is working on the evaluation through the observation and analysis of players called games user research (GUR).

Later, toward the end of production, the game progresses through of statuses which indicate how close development is to completion. Alpha status shows all content in the game, but not necessarily with a final quality. Beta status shows all content and features finished, with all but final polishing still to take place. After Beta the developer and publisher consider the game to be of a shippable quality. Once approval has been given, the publisher plans to begin manufacturing and distribution.

In Catalonia, the user has not yet been involved in the inital design processes, such as product conception since this stage is influenced by other factors such as market studies, technological advances or directly due to the editor implementing his own criteria. The involvement of users in these early stages is homework the industry needs to work on.
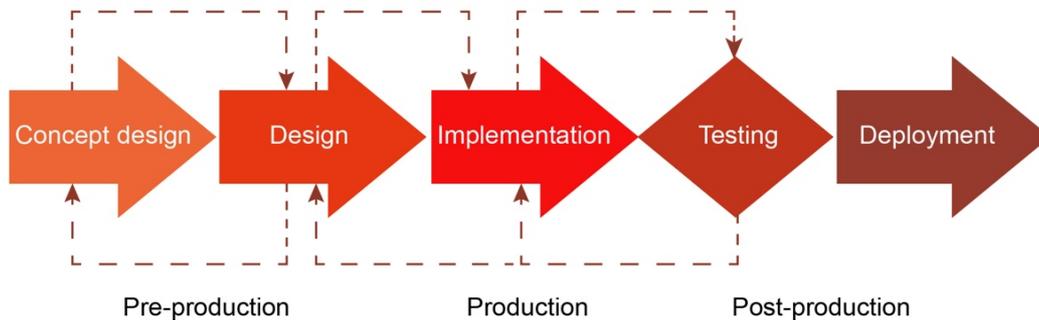
Game development life cycle

Another shared aspect found in the companies was their current business model, either due to their business model or their adaptation to the new ways of consuming games. Business model tends to be decisivie in designing a game. In the case of the 'freemium' model, in which games are offered free (for mobile formats) or cheaper than usual (in console and online games) and where the user makes small payments to access more levels (DLC) or all kinds of accessories.

The freemium game native uses a model of 'games as service'. Examples of this are games like Farmville or Candy Crush. The game is designed as a constantly evolving entertainment service that takes game data from its users, helped by a design process that carried on indefinitely after the game has been put on sale. Given that gamers pay as they play instead of buying the game in advance, the designer's task is to maximize this cashflow (monetization) and time (retention) that gamers spend on the game. UX optimization techniques, whose origin is UCD, have been used in order to refine these design decisions. Optimized UX must permit a larger number of gamers and game time, so meaning a larger number of gamers willing to pay to play.

Companies are using various methods to do so. Some of those mentioned are: Playtesting, where potential users are made to play and both their quantitative data (time taken to complete a task, places where they get stuck or pass through too quickly, etc.) and qualitative data (emotional reactions, comments, engagement, etc.) are observed. Heuristic evaluations are also carried out when an expert analyses the game's ease of use. Focus groups are used when a group of potential users debate aspects that the company needs to know about first hand. There is also A/B testing, in which design variations are launched to see which what the result of better retention and monetization will be. Some of these game companies employed usability tests. The companies began running tests with company staff, but they then expanded to recruit other people who worked

in the same building as them. Finally the substantial tests began with members of the public, recruited directly from the streets and local universities. Discussing the value of observing playtests, some companies reflect on how easy it is for game developers to overlook the simplest of things which can impede beginner players from even starting to play.

As such, trends in user involvement are appearing at times they did not before. On one hand, the users are being involved in earlier phases of the design and they are being made to test basic mechanics or general ideas where their opinion can affect the developmental path of the game. Techniques such as questionnaires, interviews or focus groups are starting to be applied at earlier stages in some companies. Another trend in design that integrates testing and user is open or closed alpha testing. These are currently popular in 'indie' game design. Gamers access an alpha-stage version of the game (playable but not finished), sometimes after paying a less-than-market price, which in turn helps the develops to finance finishing the game, sometimes by inviting 'star gamers' or influencers to play, thus ensuring good promotion for the game if they manage to get them excited about the product. An open alpha game also acts as a live testing platform. By way of an example, a part of Minecraft's success can be attributed to adjustments made to the design based on community feedback during its open alpha period. Making testing a more central part of the design process with underline this more 'handmade' approach. On the other hand, a data-based focus on game design is no longer limited to a small part of the wider industry. As online gaming becomes the norm, together with 'free-to-play' monetization, it amasses more weight in more markets, genres and game platforms. Data that comes from gamer metrics is being integrated into the design process, which then becomes a recurrent theme on a permanent basis.

We can therefore conclude that evaluation methods are more and more present in game development. What has made this possible is a new paradigm that has arisen out of a confluence of disciplines and a philosophy that makes the user the central focus of the design process. Today we have various tools and methodologies that allow us to design games that will foreseeably offer satisfactory user experiences.

Methodology

The research is divided into two methodologically separate phases: an inital exploratory and qualitative phase whose aim to to collect the opinions and practices of a reduced number of game developers (representative typologically, if not numerically) in terms of their ways of conceiving and designing the product, the use made of the various usability and UX measurement tools, as well as the role given to the user in the former. In the second phase, the unit of analysis of the survey data was company. The respondents, professionals with different roles in game development, regarded the ways of conceiving and designing games.

References

ASOCIACIÓN ESPAÑOLA DE VIDEOJUEGOS (AEVI) (2015): Anuario de la Industria del videojuego 2015 [Online]. Madrid: Asociación Española de Distribuidores y Editores de Software de Entretenimiento. www.webcitation.org/6rMMhCw86
DESARROLLO ESPAÑOL DE VIDEOJUEGOS (2016): Libro blanco del desarrollo español de videojuegos 2016 [Online]. Madrid: DEV. www.webcitation.org/6rMN49oVy

FEDEROFF M.A. (2002): Heuristics and usability guidelines for the creation and evaluation of fun in videogames. Master's thesis, Department of Telecommunications, Indiana University.

HASSENZAHL M. (2003): The thing and I: understanding the relationship between user and product. In: Blythe MA, Monk AF, Overbeeke K, Wright PC (eds). Funology: from usability to enjoyment, Kluwer Academic Publishers, Netherlands.

INSTITUT CATALÀ DE LES EMPRESES CULTURALS (2016): Empreses de videojocs a Catalunya 2016 [Online]. Barcelona: ICEC. https://issuu.com/icec_generalitat/docs/160615_llibretvideojoc?e=5788537/364976

LAITINEN S. (2006): Do usability expert evaluation and test provide novel and useful data for game development? JUS Journal of Usability Studies 2(1): 64–75.

PLATAFORMA PER LA LLENGUA (2015): Situació dels videojocs i jocs d'ordinador en català en el mercat [Online]. Barcelona: Plataforma per la Llengua. www.webcitation.org/6rMNErU3o

Section IV

Related Documents

The following documents are related to the work of the research team:

The White Book of Catalan Video Game Development 2017
Our research can be found in "Libro Blanco de la Industria Catalana del Videojuego 2016", published by the Spanish Association of Entertainment Software and Video Game Development and Production Companies (DEV) with the sponsorship of Institut Català de les Empreses Culturales (ICEC). Publication in Spanish.
http://www.dev.org.es/llibreblancdev2016

The White Book of Spanish Video Game Development 2017
Our research can be found in "The White Book of Spanish Video Game Development 2017", published by the Spanish Association of Entertainment Software and Video Game Development and Production Companies (DEV) with the sponsorship of the Digital Art and Technology University Centre (U-tad) and the support of ICEX España Exportación e Inversiones. Publication in Spanish.

Report "Communication in Catalonia"
Our research can be found in "Informe de la comunicació a Catalunya, 2015-2016", published by the Institute of Communication at the Autonomous University of Barcelona (InCom-UAB) with the sponsorship of Gas Natural Fenosa and the support of the Government of Catalonia. Publication in Catalan.

Catalan Game Companies Map
On this page you can see the map of Game Companies in Catalonia:
https://es.batchgeo.com/map/34f3b17517e285b5fb7e156e7c1bea2a

Website
On this page you can read more information:
http://incom-uab.net/ocve/es/2017/04/14/distribucion-territorial-empresas-de-videojuegos-asentadas-en-el-territorio-catalan/

**Observatory of Communication, Games and Entertainment
Institute of Communication**
Autonomous University of Barcelona
University of Vic-Central University of Catalonia

Usability and user experience methodologies used by games companies

Contact information and research team

Ruth S. Contreras. Scientific Leader
University of Vic - Central University of Catalonia
ruth.contreras@uvic.cat

Xavier Ribes. Researcher
Autonomous University of Barcelona
xavier.ribes@uab.cat

Emiliano Labrador. Researcher
University La Salle-Ramon Llull University
eruiz@salleurl.edu

Eva Villegas. Researcher
University La Salle-Ramon Llull University
evillegas@salleurl.edu

Ignasi Coll. Researcher
University of Vic - Central University of Catalonia
Scientific Leader
ignasi.coll@uvic.cat

Jose Luis Eguia. Researcher
Polytechnical University of Catalonia
eguia@ege.upc.edu

Antonella Frisiello. Project Manager in Italy
Istituto Superiore Mario Boella
frisiello@ismb.it