

Investigation of Computer Gaming Technologies

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Current Social and Technology Trends in Computer Gaming

Social Trends within gaming covers what game developers need to understand in order to make the best game for their audience when the time is right, as trends change and people look for new things, for games it's often people getting bored of a game or used up all of its playability and need something else to pass the time, with this Social Trends and big communities can change their interest in large groups of people in games over time.

As for their interest in games so is the trends in technology changing, from optimizing the true performance of a gaming computer with the top of the range hardware, to the new ways of playing and experiencing games with Virtual Reality and Augmented Reality is very impactful as this very expensive technology has got sights to be more commercially viable.

Social

Popular Genres 2016 - 2017

The current popular genres:

Action

An Action game is a game that involve physical combat, these would be also with key requirements of Fast Reaction times and very good hand-eye coordination. Games of this genre could also come to Shooting and Fighting Games. An Action Game for the example would be a new release called ¹For Honor, a Medieval Fighting Game involving both fast reaction and hand-eye coordination in a sword dueling arena



¹ https://ubistatic9-a.akamaihd.net/ubicomstatic/en-US/global/media/FH-new_screenshot-02-FULL_255395.jpg

Role Playing Game

RPGs are games where the character, like in the name, takes a role / class, in relation to what would be the lore of the game and whether the role they take may be optional to the player or not is up to the developer. Most RPGs are made in a fantasy or futuristic setting. The player would be immersed in what would be a highly detailed world with game lores going to incredible reaches, this is the drive the key part of any RPG game which is to provide an adventure, this is to get players to explore the

vast detail of a fictional reality where it's can be as detailed to each race of a galactic civilization to the detail of how the creatures of a biome exist. Most RPGs game especially the very popular ones either come in Single-Player (²The Elder Scrolls V: Skyrim) or Massively Multiplayer Online (³World of Warcraft). Many of the large RPGs games have very large communities driving them and have even gone as far as being some of the longest lasting games that have been made out of the Game Genres. One of the longest lasting RPG Games to date and still maintaining a extremely large player base is Space - Based MMO Eve Online which was released in 2003 and is still consisting of a player base of over ⁴34,000 players average active players and peaking at 53,000 players



2

<https://i.guim.co.uk/img/static/sys-images/Technology/Pix/pictures/2011/11/10/1320919365445/Elder-Scrolls-V-Skyrim-007.jpg?w=700&q=55&auto=format&usm=12&fit=max&s=8b928e1a7514f600caaeb43a79c8b34c>

3 <http://core0.staticworld.net/images/article/2016/09/wow-legion-04-100683277-primary.idge.jpg>

4 <http://eve-offline.net/>

Massive Online Battle Arena



MOBAs is as simple as saying, that a few players and have them one team, have a few more and put them on the other team and have them fight across a fixed sized map until one side loses. These games have a high competitive and professional drive when players who enjoy this genre a lot get into such games, these games require a lot of skill, reaction and quick thinking to succeed. Most of these games coming with a ranking system to grade your skill to have players aim to achieve the top ranks. MOBAs consist of a universal battlefield design following the three rules.⁵ There

must be 3 lanes, a Jungle on either side and Turrets along each lane. A very highly popular MOBA game that has had international competitive tournaments that involve having huge sums of money as prizes is ⁶League of Legends reporting with over ⁷100 million monthly players as of September 13 2016



Strategy



Putting your mind to the task to achieve victory is key to any game of this genre potentially requiring the most amount of thinking than any other game does the game require to outwit your opponent to defeat them. Mentally requiring many layers of abstraction to be able to think of the most clever tactic that can beat your enemy leaving you with an overwhelming smile on your face. The game give strategic, tactical, and logistical challenges, running on an in-game economy systems to help supply yourself with the assets to win. MOBA games are a

break off Strategy Games. Strategy games also break into two types, **Real Time Strategy - RTS** and **Turn Based Strategy - TBS**

An RTS game would be an old popular classic,⁸ Command and Conquer, the game hand many sequels to it's name and was one of the most popular RTS games from 1995 - 2013 A TBS game would be XCOM and it's sequel ⁹XCOM 2, a game involving saving the Human Race from an alien invasion on earth with the remain resources you have.



⁵ <https://s-media-cache-ak0.pinimg.com/236x/9a/d7/00/9ad700a42bfa39a8241db8e1c7ea68e7.jpg>

⁶ <https://i.ytimg.com/vi/6GfDSW5Ousw/maxresdefault.jpg>

⁷ <http://www.nifthermal.com/2016/9/13/12865314/monthly-lol-players-2016-active-worldwide>

⁸ <http://opiumpulses.com/uploads/product/213/extra/C&CUltimateCollection-5.jpg>

⁹ http://static5.gamespot.com/uploads/original/1365/13658182/2889645-xcom_2_e3_screenshot_concealment.jpg

Sandbox

A game where the player has no limitations to do what they want with the assets and functions provided, they are free from any rules to make the game of a challenge and allows the players to be creative and approach the task in anyway they want. The Freedom of choice is given to the player in what they want to do. Sandbox games include well know voxel game, ¹⁰Minecraft. The player can stick to some rules and survive with the open freedom to build and survive in anyway they want or go fully creative with ability to fly and create at will without the concern of fighting to survive.



Simulation

Simulation games are game that have been designed to follow principles of the real world and apply them to whatever setting that could accept it. These games would follow the way of being endless, with not true goal to meet though of course some games come with objectives to reach to complete the game. Tycoon Games / Business Simulators or War Simulators while having many that go along side Sandbox if the game was to replicate some sort of real world physics A good example of a simulator game and a sandbox game is ¹¹Kerbal Space Programme, a game that requires fair knowledge of dynamics and a hint of science to then construct ships in a sandbox environment to then take off playing through all the stages of space travel, using gravity and a lot of waiting to reach planets and send satellites in its expansive universe



Players

Newbie

Most commonly known as a 'noob' they are players who are completely new to a game, and have no skill towards it. 'Noob' is a slang terms for this as well as a curse term when talking to other players.

¹⁰

https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwj2rpjgnafSAhUBWBoKHY_XAjoQjRwIBw&url=http%3A%2F%2Fgame-accessibility.com%2Fgame%2Fminecraft%2F&psig=AFQjCNGoHaA3zh_Yuh0TQw-SnNS4vSUavA&ust=1487974124407579

¹¹ <http://vyssinia.com/wp-content/uploads/2015/07/Kerbal-Space-Program.-1024x573.jpg>

Casual

Casual players are the silent majority of video game players, they would pick their choice of platform in means of being able to socialize and play with friends and though like all players are contempt of winning they will not take a heartbroken loss to mind and get anywhere mad at the game. Casual players will play games with aim of ease of play. A game such as ¹²The Sims would be something aimed for Casual Gamers. These gamers would not have a dedicated Game Consoles or a High End computer to run AAA games and the hit titles but something to play the light and less demanding in hardware games.



Core

Gamers who can be slightly dedicate to a game over a large period of time, enthusiastic to play all sorts of games and are regular users to many game genres, being able to pick up how to play new games fairly easy, understanding very common Game Mechanics. Long MMO games with a long hauled story and quest may not be in the interest of Core Gamers but very common actions games such as



¹³Battlefield 4 would be of the interest to these players. These players would normally have a dedicated Games Console or a well performing PC, enough to meet the requirements to run many games on satisfactory settings

Hardcore

Hardcore gamers, they take the game seriously and would have one of the highest skill levels compared to Casual and Core gamers. They are the voice of the communities behind every games and will go out there way to get the best performance and learn every trick to then get the advantage over their opponents. Harcore games can also be Rage Gamers, they will be players that take loses to heart and get mad when they lose to their opponent. Hardcore gamers are also people who would be fixated on a single or narrow range of genres but would be Extremely dedicated to it, committing to forums and online communities that sit behind their top games, they can be very picky on these games will many are able to casually play other games outside of their range as if they were a Core Gamer. Hardcore games will go with spending their spending money on Video Games, Game Consoles or PC Hardware.

¹² <http://static.tvtropes.org/pmwiki/pub/images/sims.png>

¹³ https://i.ytimg.com/vi/vSh_JHWyupM/maxresdefault.jpg

Professional

For the lucky group, playing games is their job, their way of living, they make money for playing games and this can come from two avenues.

Esports

International competitions that have two highly skilled team of players that go head to head in a tournament system where the prize for first place is a huge amount of money with the bigger more competitive games out there that have support direct from their developers and major brands. Most major **Electronic Sports League - ESL** Teams would have a backing from sponsors who would pay to for the team as well as providing them with shirts that would have their logo on them to promote their brands to the huge audience of ¹⁴Esports, with Top Rated games such as ¹⁵CSGO having a prize pool of \$1,500,000.00 and if you think that's a lot Dota 2 reaching a prize pool of \$20,770,640.00 in the 2016 Internationals



¹⁴ [http://forumcinemaslv.blob.core.windows.net/1012/Event_8018/gallery/eslone_cologne%20\(19\).jpg](http://forumcinemaslv.blob.core.windows.net/1012/Event_8018/gallery/eslone_cologne%20(19).jpg)

¹⁵ <http://www.esportsearnings.com/tournaments>

Youtuber / Streamer

Youtubers and Streamers are players who record the content of them playing games to then have it seen by the internet, with millions of people everyday watching other plays some of their favourite games, this may be due to their humor while playing a game or even just their amazing skill that not everyone can hit.

YouTubers and Streamers make money in the same way and there is nothing stopping them from being both.

Donations and Ads, Donations on YouTube are done through Patreon while Steamers are done through normally direct link to their PayPal with the incentive that they can feature a message during their live stream/

Number of Players

Single-Player

These are games that would follow a story, something where the player would follow a fixed linear path through immersive or very action filled, these games can be very popular for those looking for immersive experience where they are brought into a new world on their own against NPCs and AI controlled opponents or sometimes you can be all alone by yourself, Games such as ¹⁶Firewatch put in a situation where you are alone in the woods on Firewatch duty, only talking to someone through a radio in a immersive game of uncovering a dark secret. The trend for Single Players games are more immersive and interactive story driven games, games such as Undertale are an amazing example as some parts of the are not witnessed on your first iteration of the game as you are randomly given a number at the start of each run that determines your fate and events that can happen in the game.



Multiplayer

Multiple people in one instance of the game, these are brought to games that are good when playing with others, this allows to make individuals collaborate, communicate or fight against each other. Something that cannot be done with AI in single player games. Multiplayer also mean that each player can play with the flexibility of Human thought, which Single Player also lacks. With many multiplayer games designed to have



¹⁶ <http://www.firewatchgame.com/screenshots/firewatch-e3-5.jpg>

a team of players against another. A very popular multiplayer game would be ¹⁷Star Wars Battlefront, 32 vs 32 players fighting across maps based off the original movie. Multiplayers are always a want from the audience though it's normally a theme that gets the Trend, with the World Wars being the Trend for 2016 that EA met with Battlefield 1, a WW I era game

MMO - Massively Multiplayer Online

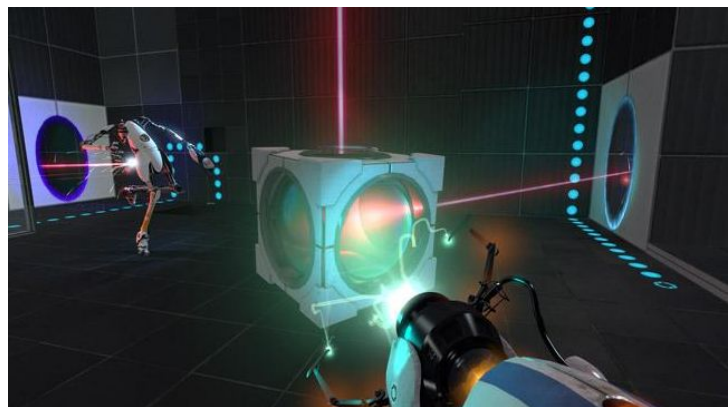
Massively Multiplayer Online is a branch of Multiplayer Games where it involves gameplay that is made just for playing with other people where many players over hundreds to the thousands can participate in a single instance, these games have large scale networks and the lore behind a given game would have



amazing detail as well as a story behind each line of entities in the game. These games work on platform with a very solid network capability, PCs and Consoles. An MMO game would be ¹⁸Black Desert Online, a Medieval Fantasy game that has a world that takes a lot of time and dedication from the re world to even discord a portion of it's size, with extensive detail down to the design of each character. Trends towards these games have been on the rise by no games has yet to create a hit game that would reach the levels of what some of the old but popular names have to date with one exception in development, Star Citizen with a crowd funding of over \$143,609,093 USD

CO-OP / Party

Co-op / Party Games are games that normally tend to have up to 4 players in game where they have to work together to complete their goal. They put collaboration as a key point in many of these games while also having party games where it will put everyone against each other. A very popular Co-op game is ¹⁹Portal 1 and 2, a game about using Portals to Travel and Transport objects to



complete their objective to reach the end of the room and proceed. These games have a very high popularity to Casual and Core Gamer with the exception of Hardcore Gamers taking a break

¹⁷ <http://www.gamerevolution.com/images/misc/Star.jpg>

¹⁸ <http://i2.2pcdn.com/2015/www/2015/08/20/blackdesert/horserace2.jpg>

¹⁹ http://web-vassets.ea.com/Assets/Richmedia/Image/Screenshots/Portal-2-Screenshot-02_656x369.jpg?cb=1412974842

from being hardcore. Many indie developers satisfy the demands for this game as they are easy and simple to make for small teams.

Security

Security in games can be very important, as much as security can go as far in some minds to keeping your PSN, Xbox Live and Steam accounts safe as the average user for the developers of many games, especially in multiplayer games, are what reaches the concern of security coming to cheaters and hackers that will use exploits and even to as far as using third party applications to have the computer do the work that would normally require player skill or commitment to gain. This is very critical and can actually result in some major cases in a professional side of gaming.

Services

Services such as PSN has had a lot thrown at it as a gaming platform in terms of security and hacking. Focusing on 2 key events that happened to PSN, in 2011 a hack claiming to have stolen 2.2 million credit card details was confirmed following a response from around 77 million users on PSN to have said their cards was involved with unauthorized spending. That alone made a big hit for many PSN users, killing PSN's reputation in days though Sony played it cool, trying to play the, "oh we can't be too sure that we were hacked" while going up to certain few and directly contacting them about their cards possibly being breached. After that, it didn't get any better, between 2011 and 2015 were small claims of hacking, nothing on a big scale until Christmas of 2015 where notorious Lizard Squad²⁰ took down PSN and Xbox Live services, this included everything from downloading digital games to simply getting on online multiplayer, let alone to say 850 million players actually had to get up and talk to the family this Christmas. A Lizard Squad member claimed to say he did it to raise awareness on the poor spending of the services while also not feeling bad about it.



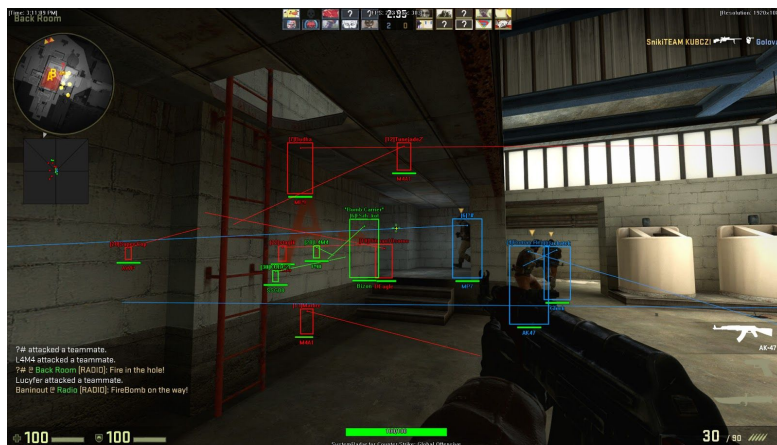
²⁰

https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwj3fbt OrSAhWLvhQKHSSyAd4QjRwIBw&url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DpgFV5XUU_gk&psig=AFQjCNGWP5t000-LbjW jI7tRzObTniKq&ust=1490301713797190

Games

Games can get challenging, even the simple ones and from that, you will do whatever it takes to get a winning edge, while some do that by spending time on nothing but becoming masters of the game, some resort to breaking the rules and using 3rd party software to 'give them a hand'. This can be as basic and being able to see through walls and see your opponents to having your computer do the shooting for you, even to a level where it can beat

masters of a game. Hacks of this level is more used in multiplayer games especially in the Shooter and Competitive genres, CS GO²¹, Battlefield 4 and Overwatch are games that have a constant back to back case of hackers in their games. Though hacking in game may be as little as unfair play in games it can prove to be very serious in the professional gaming industry, Pro-league players have to put immense practice in order to perform the best of the best though some have been caught out to be hacking making huge impacts to the pro-league gaming, and in some cases, you can get arrested for hacking in games. In the defense of hacking in games major game developers have implemented their own anti hack systems while others use external services to provide protection against in-game hackers. While Overwatch have their own private anti-hack system that goes as far and even when you make a new account, use a vpn, use a completely different computer that you are still banned after one hack offense, many such as EA go to external services such as 'PunkBuster' to provide an anti-cheat solution. Though there are these systems most are just analytical scripts to find players who are outliers in the playerbase average, for many some players with extreme skill could be marked as a hacker and penalised for 'being really really good'. Battlefield 4 player and Youtuber - Ravic, is a player who has a skill in the game so extreme that he has been called hackers multiple times and banned from a few game servers by admin who though the anti-cheat was faulty.



²¹ <https://www.systemcheats.net/wp-content/uploads/2015/03/CSGO-Screenshot-2.jpg>

Technology

Software / Games

Publishers

Game Publishers are expected to be holding on to their current ring of game developers as Indie Developers and more Independent game developers arrive, though not big enough to compete with large game Publishers companies there are sure some Independent developers with the reach of these major Publishers companies like EA. Hello Games, the Developers of No Man's Sky got reach that would've normally come from a AAA games (even if it had a very bad release).

Distribution

Everything is going digital and the life of shops like Game are on the decline as Playstation Store and Xbox One Store allows for more and more digital download of the biggest titles. This is clear as Game and stores alike have brought up methods of Selling Second Hand Devices and other cheap but attractive Tech Products. As digital distribution on the rise the change from going to a store and instead having it delivered by clicking the buy button on the internet is drastically going to change as in terms of Costs there is no need for retail shops to add their own price meaning that Consoles and Games can reach cheaper costs.

Development

Game development is constantly changing as it's in the stage of 'rise of the indie developers', like my example above Hello Games is an independent company that stuck big and were able to make a game looking at a high quality as more and more public software is being released not even including open source which allows people to start making games and for People such as Toby Fox, the developer of Undertale, a RPG interactive story game sold 200,000 copies with only a fundraiser of \$51,000 which only had a goal of \$5,000.

As more and more developers enter the market so do ideas and though many developers do try to rip off games, make poor performance of them and overhype or exaggerate to try grab an audience there is always a diamond in the rough.

Hardware

The trends in Hardware technology have a very clear agenda, trends are changing with 4K and Wide-screen resolution gaming are head to head in the PC gaming monitor where you can play with the finer details or have the more immersive experience, while getting the gaming standard 60 **Frames Per Seconds - FPS** to be able to see movement in the game clearly. Everyone is getting to grips with how they see their game and with the trends coming to closer to high quality many game devs and hardware producers need to make the technology for 4K and wide-screen support be a thing if they want to stay in the market of the future in gaming.

In the world of better performing technology reaching the stage where we are pumping tech out more than people can buy it, it's now a fight for the best for cheap and this is where brands like Intel and AMD have both been the CPU makers for the past 2 decades and all in good time to be talking about them as AMD has finally taken shots at Intel for the best and cheapest CPUs available to the gamer's market, AMD have developed their latest series named Ryzen, a CPU for incredible performance while making it considerably cheap while Intel have for the past decade been developing CPUs that performed better than AMD with a small premium pricing.

Intel



Home to amazing Hyper Threading technology and Overclockable stable CPU to deliver perfect stability in games while multitasking with other applications around your computer, their prices do take a hit to cheap PC makers but their reputation proceeds them with reliable and well performing CPUs, improving constantly every one or two years with a new generation as Intel have just entered the ²²7th Generation of CPUs though they support that 'overkill' performance that the niche that Core gamers that care about performance graphics care about.

AMD

AMD supply both the PC and Console market with cheap performance CPUs, AMD are both experimenters and price conscious with their CPUs for Gaming Hardware, Making APUs (Accelerated Processing Units) which are simply CPUs with the power of a graphics card to render games all of the single chip, striking amazingly well in the mobile devices and console hardware market with gaming laptops starting from APUs years ago and having the PS3 take it into their hardware upon first release. Also with FX technology which involved their first takes on Intel's Hyper Threading to take their own stance on this and now to have released the ²³Ryzen Series, CPUs that have 'perfected' Intel's Hyper Threading have they managed to make the trend mark of Cheap and Better performing against Intel and allowing people with low budgets to enter the PC Platform Community.



²² <http://www.techspot.com/images2/news/bigimage/2017/02/2017-02-22-image.jpg>

²³ <http://www.techspot.com/images2/news/bigimage/2017/02/2017-02-22-image.jpg>

Current and Emerging Technologies and Their Impact on Design and Development of Computer Games

Current

Engines

Engines are the main process of any game and is essentially the core of the game, it handles the Main Game Programme, Physics, Audio, AI and even the whole rendering of the game. On the first starts of a game engine there were very large limitations to what was possible, you could only made map this large on a screen or there was only so much you could have rendered before it wouldn't be good for the performance of the computer.

Engines to the current day can reach the power of processing the physics of objects as if they were in the real world, as creating and destructing become even more detailed down to the impact of shooting a wall in a round of ²⁴Rainbow Six Siege, a Strategy Based Shooter. These details can make the game more immersive and the experience of realism in a game just that much better for a game like this they make the game have the ability to be designed to have incredible detail given they can develop the programming to make the magic happen



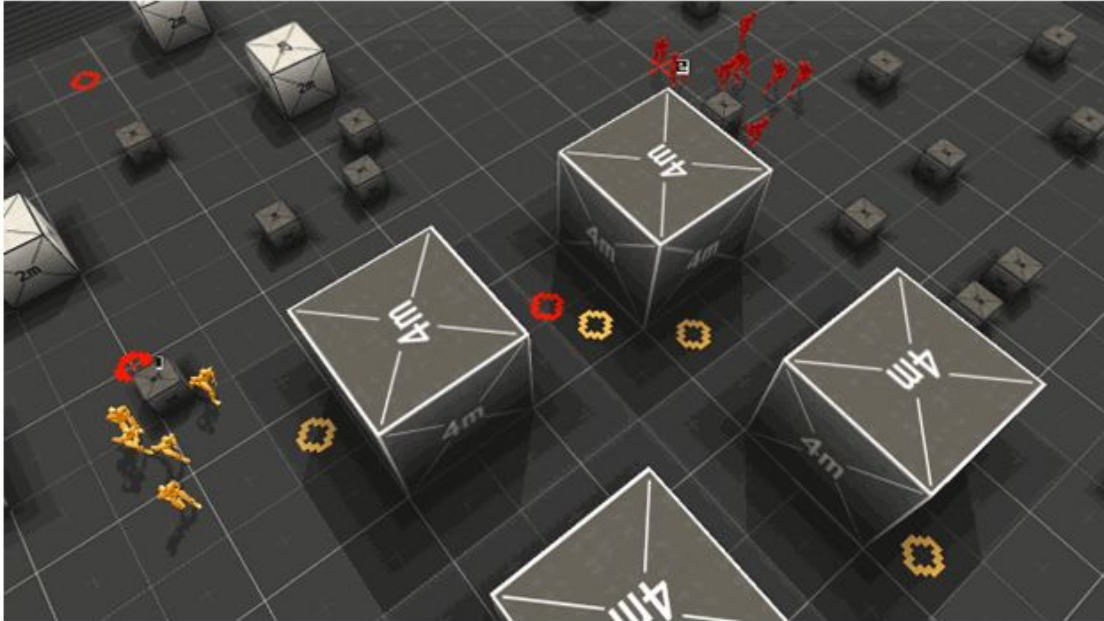
For game rendering looking at that the graphical capability of the modern engines that have the power to reflect light and create detailed water with the help of the physics side of the engine has today's engines been able to create a high detail to nearly replicate real world assets, this has been the goal of many engines though not all to allow to have more in depth realism and a larger impact to gamer and their experience

Artificial Intelligence

With Artificial Intelligence it's is something on it's own, separate from a Game Engine as most developers of Engines make them modular so AI programming can be outsourced by someone who knows better. They play the role that the game doesn't intend the player to be in, be it that scared civilian in GTA V who runs away and the sound of gunfire or the shop keeper who you

²⁴ <https://www.custompcpreview.com/wp-content/uploads/2015/12/siege1.jpg>

sell the scraps that you or they probably don't need. AI takes these roles so you can be the protagonist of your game by when it comes to those who directly help you in your goals or fight against AI has been an interesting topic coming to how they can impact the game's experience to the player.²⁵



If the AI doesn't even get the grips of helping against enemies then it would put the player in the shoes that he is alone with some useless people following them while if the enemy AI doesn't know how to fight the player then it would be too easy and boring. To create AI advanced enough to give the player a challenge isn't really there in general to the level that people are looking for or could say they were satisfied, instead to make games harder in difficulty you would get Handicapped or the AI gets a boost like more damage from their bullets in a shooter or gets more resources, as if they were cheating. Right now many have reached a stuck point for AI as there has been no change in AI and how they can make a game challenging other than how the game works and how well the AI is programmed by the developers.

Specialized Inputs

Gaming Mouses and Keyboards



All down to the detail with the precision from some on the PC gaming platform, players will take whatever they can to get an advantage in a game especially if it's competitive. Mice and Keyboards are one place to start, Mice that have been made with more button than the simple Left,

²⁵ <https://software.intel.com/sites/default/files/m/d/d/c/2/4/23931-figure3.gif>

Right and Middle mouse buttons being mice like the ²⁶Razer Naga has some mouse been made to have up to 32 different buttons on the mouse acting as Macros, a set of instructions to be done in a specific order, though this is more common for Keyboards. Gaming mouse also take into consideration the shape and size, to perfectly fit the hand with a size that can fit all, with gaming mice having the perfect shape to fit a hand on to make sure it is purely comfortable while also having precision that is managed by the player.

Gaming Keyboards that have been out for a while and the first thing to say about them is that they are mechanical, like the old days. Mechanical Keyboards use switches that are activated when you press down on the key, there are different types switches that can vary the feel and performance of the keyboard, be that it has a push back force / tactile feel or to make the keypress be detected 0.1 of a second faster, it's always about pushing what is available to the limit and is what mostly PC gaming peripherals do.



Macros are a common thing to most popular gaming keyboards available, Macros Keys are essentially like a Shift Key, where if you press it more options on the keyboard become available to you, but instead of when pressing a you get a capital A, you instead activate a Macro, and this can be done with every key on the keyboard and even have more than one set of Macros Keys. Taking into account the average keyboard has 104 keys, having up to 5 Macro Keys on a keyboard depending on the model like the ²⁷Roccat Ryos could mean you could have 520 different pre-made instructions to use in games, that be typing in chat or doing an action that requires hard to replicate precision.

Gaming Keypad

Gaming Keypads are a device made to replace the keyboard when playing a game, these keypads meet the perfect shape and placement of buttons for someone to be able to have all the essential keys that one would need, as well as that it's can have the placement of extra input devices such as a joystick as the design of these gamepads allow space for the Thumb to have extra movement. A current lead in this niche but popular market is Razer with their flagship Gaming Keypad the ²⁸Orbweaver



²⁶ <https://assets.razerzone.com/eeimages/products/13785/razer-naga-2014-right-02.png>

²⁷ <https://i.ytimg.com/vi/4R4QlpMoTH4/maxresdefault.jpg>

²⁸ <https://images10.newegg.com/ProductImage/26-153-116-14.jpg>

Controllers

Controllers are the way most Consoles are interacted with to replace the Keyboard and Mouse to an ordinary PC. The controller unlike the keyboard only has to consider how it would input to a game in the simplest and most effective method while still giving them full control and the result is a shape that is perfect for you palms to grip and each finger can be given a button to do what they want in the game. This allows those for Console Play to enjoy the ability to sit back with a small Controller that can all the moving, looking around and interactions for whatever game it may be. Developers have designed games that work best on rather than Keyboard and Mouse hence making a bias towards console in that factors. Some games do get ported to PC with Keyboard and Mouse controls but for many games the experience would just not be the same without a controller such as the ²⁹PS4 Controller.



ThumbSticks

Controllers have ThumbSticks, a simple way for the player's thumbs to move and guide the character of any game on the screen with the control on how fast or slow the character moves depending on how far they push the ThumbStick in a given direction. This allows for precision gameplay in games that require high accuracy such as shooters.

Flight Stick or JoySticks



For games that maybe more niche, such as flying specialized peripherals such as ³⁰Flight Sticks / JoySticks that have been made for these certain games. These allow you to mimic but simulate physically certain aspects of something such as flying an aircraft. This helps to support the immersion from the real world rather than simply having the game be highly detailed in lore and design. Hence adding to the player's experience. A really good game that had adapted this very well is ³¹Elite: Dangerous, their game is a Space Theme

Action Simulator and had been made with use of a flight stick in mind that they took made the control



²⁹ https://www.evilcontrollers.com/media/catalog/product/cache/1/image/490x351/9df78eab33525d08d6e5fb8d27136e95/p/s/ps4-stockblack_2.png

³⁰ <http://i.imgur.com/9vfKXdq.jpg>

³¹ <https://i.ytimg.com/vi/JeoRlvo3Zzc/hqdefault.jpg>

optimal for it, this would be controls such as controlling the power on your ship and turning on weapons.

Steering Wheel

For racing at high speed the experience can make an edge in many racing games, as game engines have improved and with physic engines reaching very close to real the amount of detailed racing games out there are on the increase, but controlling it from a Keyboard and Mouse is no good and a controller isn't always the best. To actually get a feeling for driving the



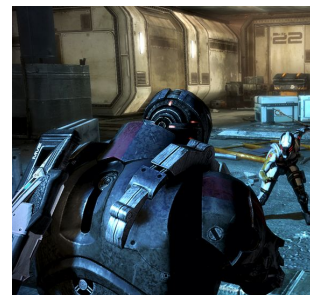
car players would want to have felt like they were in the seat of the car controlling the turns to the precise angle, well with Gaming Wheels they can plug it in and sit back while the steering wheel mounted on a stand and the gear pedals at their feet, this successful device has made it for many to unlock the true experience and as game who are making games that involve Racing or any form of driving as the Main Core Mechanic of their game have gone through the process of making the support for a Steering Wheel and the Gear Controls.

Environmental Sensors

The Nintendo Wii used sensor technology to make the motion controllers be use in their games, this was so it could track the position of the controller and then replicate the movements in real time in the game, the ³²Wii Sensor Bar allowed the precision and dynamic controls to move in a Virtual 3D environment that you could see on a screen with your body, all it required was you and some good hand-eye coordinations and a bit of care when you swing your arms around the room not paying attention that it's just a game.



The Nintendo Wii wasn't the only one to use this kind of idea for players to interact in a game with their physical movements as Microsoft showed off with the Xbox Kinect. A Screen mounted sensor that could see the person and copy his movement into a virtual 3D environment. It also had voice recognition and some games had designed it around allowing the user to talk into the game in order to interact with certain aspects of it. Games such Dance Central used the movement



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<https://www.google.co.uk/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&ved=0ahUKEwjEmMW29KfSAhUDWRoKHcX1BK0QjRwlBw&url=http%3A%2F%2Fwww.dinowish.com%2Fdx%2Fwiis02-wired-remote-sensor-bar-infrared-inductor-for-nintendo-wii-u-silver-black-p-10829.html&bvm=bv.147448319,d.ZGg&psig=AFQjCNH8mOX2q6GqgAnn78QBq26u-NUQZg&ust=1487997396876535&cad=rja>

of players to play with the game while Mass Effect is an example where they allowed voice to control the game and in this case command their allies to aid in fighting.

Specialized Outputs

Over the time of games new ways other than sound and visuals alone have been made to make the gaming experience just that much better, from creating a physical product to go along with a game for the better experience or to get more worth out of the game to the new VR technology. It's all exciting to have the game interact with other than from just the virtual word from you TV screen or Monitor.

Immersive Peripherals

More on the real world interactions side of games, Controller have Vibration or Rumble features, they make a shake when something happens in the game to give a feedback to the user, this can make the experience more immersive and interact with the real world, making the experience much better. Especially in action fill games with sudden movement.

For Keyboards a Special few are made to light up depending on the situation in a game, such being the Roccat Ryos as a clear example, the top row of keys on the keyboard can light up like a progress bar to there show the players characters health or energy. This is a way of the same output being shows differently but adds to the gaming experience and what happens in game has a reflection to the real world.

Virtual Reality Headset (HMD)

Head Mounted Display or VR Headsets as it's best known are ways for seeing to the virtual world like you are really there, being able to see everything in the world in detail down to the depth perception and how your brain thinks it's actually all real. This has emerged after years on top of years of failed prototypes had only allowed us to lead to making some of most fascinating game devices today, though VR isn't just for gaming it is the main scope of it. With the Oculus only taking launch less than one year ago and the ³³HTC Vive just a month after Oculus the VR industry has exploded, though it hasn't gotten much in terms of everyone buying a VR kit, as the prices are very high, but there is no doubt that it's got everyone's attention to apoint where console and mobile app developers are making VR for their products and platforms, to stop from PC platform taking the spotlight in the VR headset market. This has taken a big hit as it's a chance for indie developers to make their mark, as it's stand right now only Steam and the Steam VR has entered the VR market out of the large game developers out there as many do not yet see the possible market from VR technology. Hence indie developers can take this chance to make games for the VR Platform and quickly get a name out there if it goes well, VR has set a trend of indie devs wanting to hit a very potential market, it's a big risk and they have little to lose unlike the bigger companies so why not?!



³³ http://cdn2.itpro.co.uk/sites/itpro/files/styles/article_main_wide_image/public/2016/01/htc-vive-product-1.jpg?itok=sQE4KIUi

Augmented Reality

Augmented Reality is the use of Phone and physical devices to use as a 'portal' to see into the virtual world, it's a way of bringing virtual objects into the real world using your mobile device as the bridge, the unforgettable ³⁴Pokemon GO was an augmented reality game that used locations around cities to then have areas for you to find and catch Pokemon and challenge others, with this there would be scenarios where hundreds of people meet up to go pokemon hunting it's a way of getting physical and social interaction from a game and is incredible to witness the way of using the real world to play virtual games.



Another key example of AR is the use of it merged with VR, Microsoft work with Minecraft to deliver an AR experience of the game with the result of the ³⁵Minecraft Holograms using a Custom VR headset with a camera to see the real world could the headset create the minecraft world out on physical objects, you can see the Animal, blocks and see underground by putting your head into the world with no restrictions but the table you may hit if you were to bring your head too low, this was shown just over 1 and a half years ago and as minecraft has a big audience did it sure catch the attention of many people.



³⁴ <http://qearnuke.com/wp-content/uploads/2016/07/pokemon-go-release-date-beta-image.jpg.optimal.jpg>

³⁵ http://core0.staticworld.net/images/article/2015/01/microsoft_windows_holographic_3d_minecraft-100564050-orig.png

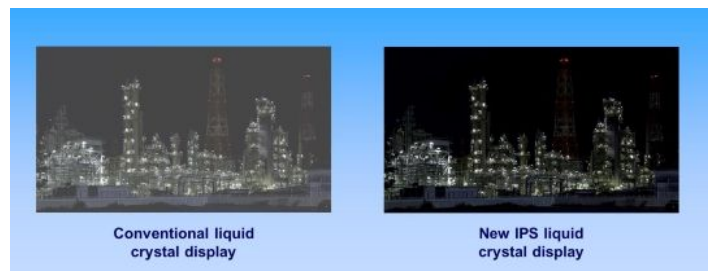
Emerging

A lot of emerging technology is coming in the years ahead with either current technology taking huge improvements such as a Monitor and Screen designed for gaming, and the HTC Vive going wireless to completely new concepts and devices like the Virtuix Omni, a Locomotion simulator

Monitor Technology - OLED and Super IPS

A bit war has gone in monitor technology, with this year the unique and powerful features of TV Screen Technology is now being made for Desktop Size Monitors, this would be features as OLED which is simply better quality and faster response time, OLED allows for more ³⁶“blacker blacks and brighter whites” OLED is the next thing to a higher range of colours.

In rival to OLED is more advanced ³⁷IPS Technology for LCD displayers. IPS was first made to remove the limits to the amount of colours in detail that could be displayed on a monitor until now they have the technology to bring that limit higher, as the same as OLED does it mean for higher and crisp detail.



Specialized Input

Virtuix Omni - Motion Simulator

The ³⁸Virtuix Omni made a very big name in its early prototyping at EGX - Euro Gamer Expo in 2013 and since then it's been a come and go name, the Virtuix Omni is a device that allows a player to simulate movement on a stationary platform, designed to go with a VR headset and the occasional physical object like a replica gun made for the Omni this was a way to let the player into the 3D world while adding an extra layer by adding movement to the player, it allows them to feel like they are really in the world and immerse them in a totally new experience, the Virtuix Omni is still a idea that stands out but as they get closed to developing it further there is less then want to reveal during the making, but this technology could set a new level for truly immersive gameplay and how players want to experience the virtual world.



³⁶ <http://www.techradar.com/news/television/oled-tv-what-you-need-to-know-1056228>

³⁷ https://www.pcgamesn.com/sites/default/files/Super%20IPS_0.jpg

³⁸ <http://powerupgaming.co.uk/wp-content/uploads/Virtuix-Omni-Image.png>

Specialized Output

Wireless HTC Vive (Vive 2.0)

VR has gone wireless there is nothing much special about that, but for the support of the wireless VR names like Samsung VR and Google VR, though they are wireless the support for them is very little, there is not much in terms of development to where people would want the



product, the HTC Vive has had incredible backing and a number of developers support the platform to deliver the best out of the device, with a lot of games on there and more and more developers making games for its , it can only get better when the limitations to movements to cables go away with the ³⁹HTC Vive 2.0, this would allow a better experience for letting two people move around the same space without one falling over the other's cable and let cooperation in VR reach a new level, allowing to physically

interact with your partner would be a game changer in VR given where it's at right now and all you have for feel are just two Motion Controllers. Design wise would be games that are made for two people to co-exist in the same VR environment.

³⁹ https://www.pcgamesn.com/sites/default/files/TPCast%20Vive%20wireless%20adapter_0.jpg

Comparisons between different technologies in terms of their impact.

PC

PC games -

League of Legends

HearthStone

Overwatch

CSGO

	Benefits	Negative
Player	<ul style="list-style-type: none"> • PC games aim to be cheaper • Cross Platform Accessories (Use of Console made controlled on PC) • Strong Modability on many PC games • Hardware constant upgradable at any time • Control of Graphical setting allows range of hardware (Bad - Good) to play the game • Old games can play on modern PCs 	<ul style="list-style-type: none"> • Games optimization for specified hardware leads to bad support of different PC rigs • Less Stable • Reputation of abandoning developers • Internal Separation of PC distribution services
Developer	<ul style="list-style-type: none"> • Easy to develop and document • Controlling graphic adjustment • No need to pay publishing fee 	<ul style="list-style-type: none"> • Easier to download Illegal Games • Harder as a developer to gain a name

PC holds the market to the second biggest gaming platform, being the side that has the most money to throw mean the PC market is a very powerful one, games such as Star Citizen can prove that as they achieved almost \$150 Million USD from PC players crowd funding the game, so no external investment or game publisher behind them.

PC's open source nature has the largest impact on indie devs seeking to make new games or get into game development and many names have risen up from independent game companies.

Console

Console games -

Halo

Fifa

CoD

Overwatch

	Benefits	Negative
Player	<ul style="list-style-type: none"> • Console Exclusives • Game Optimization • Cheap Gaming Hardware 	<ul style="list-style-type: none"> • DRM, no modding capability. Limited to developer's content • Stuck to controller input along with console made accessories • Latest consoles require subscription to play online • Cannot play older generation console games on modern machines under the same family (e.g. PS2 game on PS4)
Developer	<ul style="list-style-type: none"> • Specialized Input • Console has no hardware fragmentation, making easier optimization as developers know the hardware to develop for • Publisher of the platform will help to promote new games of all types, allowing indie to get a name on console fairly quicker compared to PC 	<ul style="list-style-type: none"> • Limited to power of the console hardware • Licensing fee • Little to no Open Source availability

Console is a very closed environment, developers have to pay considerable amounts for the software to make a game for the platform let alone having limits to what they can do down to the console of choice's hardware leaving little opportunities for Indie devs.

For market the console market is the largest game market out there with the more ease to play type of players, this mean that this market is very manipulatable when done correctly and can cause a huge impact to companies selling their game across the market. Including such options as some platforms charging to play multiplayer with a monthly subscription.

Mobile

Mobile games -

Candy Crush

Clash of Clans

Boom Beach

HearthStone

	Benefits	Negative
Player	<ul style="list-style-type: none"> • Mostly Free Games • Portable platform / devices • Cheaper than PC / Console • Game Emulation • Phone features provide unique input to game • Cheap Premium Games 	<ul style="list-style-type: none"> • Many games have paywall / pay to win • Most games are generally simple • Game time battery dependant • Little to no cross over from Console / PC platform
Developer	<ul style="list-style-type: none"> • Usage of mobile devices are high, a certified platform to gain some sort of audience • Cheap and simple to develop • Revenue from Ads and In-app Purchases 	<ul style="list-style-type: none"> • 30% cut of sales of an app with Google or Apple • Different hardware per phone • Apple do not allow open source • Many apps being uploaded, long time to approve an app

Mobile is another nice platform for indie developers wanting to make a name and aim it at a platform that is a bit more 'lighter' as it's games are not performance demanding and looking for a level of complexity in most cases like PC, though given that the mobile app market is flooded with apps though it's easy to make one, it's hard to get noticed and have someone download their game apps. For Indie devs it can be impactful but it needs a lot more time and consideration to allow it to stand out (Just look at flappy birds)

Mobile Games strike well on the commuting in the morning and afternoon to and from work population as mobile games are an easily accessible product when on the train hence making it a chance for them to get addicted to some of the most simplest games to then miss their stop, in terms of Mobile App, it has a big impact developers who get their game out right and to commuters and ways they kill time on the train.

Web Games

Web games -

Dark Orbit Online

BattleDawn

Battlestar Galactica Online

	Benefits	Negative
Player	<ul style="list-style-type: none"> • Mostly Free Games • Easy and immediate to access, minimal download • Run on low performance hardware • Incredible range of games to play from 	<ul style="list-style-type: none"> • Always need internet • Some MMO Browser games have paywall • Low support to 'mini' browsers
Developer	<ul style="list-style-type: none"> • With the support of the Unity engine addon for browser, a lot of advance games can be made for such a simple platform. • No publishing fee, all you need is to pay for hosting the game • Easy to create • Ad Revenue and In-game purchases for certain games • Game can be embedded on any website. • Highly open source 	<ul style="list-style-type: none"> • Originality is hard to create with the amount of choices out there • Limited by browser • Limitations in power of game without having long download

Mostly Free and easy to access the Web Games market has it best for those not looking to spend a dime into games, they are happy playing free and light games on the internet and surprisingly, there's a lot of those people out there. This is a great place for developers to get a hang of making a game and very good learning environment.

The best part for the players is that since web games are probably the enviroment to have to most experimental idea for games there is no end to there being new games for them to play, always finding a new hit time to time that can keep them interested for a while

Conclusion

To target the right platform is all down to your target audience;

For those who seek a game with full detailed, maximized potential and a game that makes the full use out of modern capability PC is your choice

For those seeking to be able to play casually or competitively while being able to sit back in the couch with games that give high performance and quality then Console comes in. Also with those who aim for a cheap platform though game prices get ramped up due to this.

For those simple casual light game player, who would play when they simply have the free time to do so then a mobile game is your choice

For those who want to simply play and have a basic level PC or Laptop and are not looking into investing into more technology is where Web and Flash games show up.

The Requirements of the Computer Games Parties

Game Players

The Requirements for a player in deciding to play a game is very simple, it just needs to meet their choice of gender and suffice for the type of player they are, that be Casual - Professional. Of Course when it comes to platforms everything is different at each platform wants games of a different type

PC

As PC players are those who aim for games that can take the performance to the max, as PC games have the best support for Mods in games they find replayability in games that can be modified to add more and more to it. But as they require a game to suffice for modifiable large scale games being a good example Arma III they also need the affordable components to meet the heavy performance requirements to run a big game and community made modifications

Console

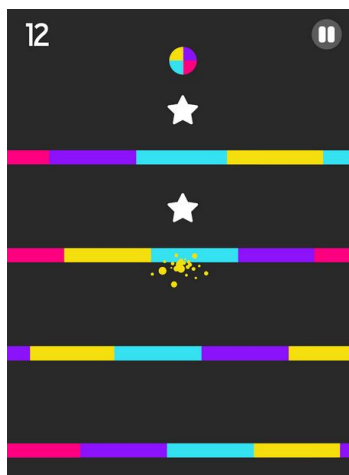
For players of the console platform, two things, ease of access and simplicity. Console is made for those who want to just plug in a £300 - £500 box, connect a controller, run a game and go one with their gaming session, they don't want anything for the thoughts with technical issues or minor details to boost performance. They want simple and easy. For the games it's games that can still allow the player to socialize with other either through co op or competitive play

Mobile

Mobile gamers can be every and anyone, if you have free time on any travel, there is enough time to kill for a small check up on Clash of Clans or a quick song on Piano Tiles. Depending on the player's individual commute decided how the game should be.

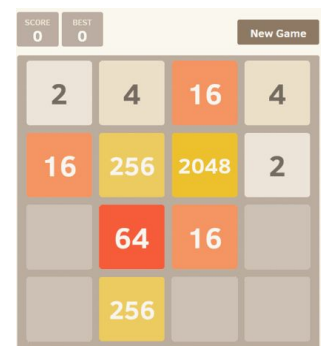
Less than 10 minutes

A very quick game, and simple game, doesn't have too many complexities and it's very fast between each iteration of playing the game.⁴⁰ Colour Switch being a good example for a game of this category.



10 - 20 minutes

Games that need a lot of thinking and strategy would lead to a game that you would play lasting around 30 minutes per iteration with a feel for not doing anything else till you reach your goal or lose the game.⁴¹ 2048 would be a good example of this, a game that progressively gets harder till you reach the point of lose lasting around 30 minutes.

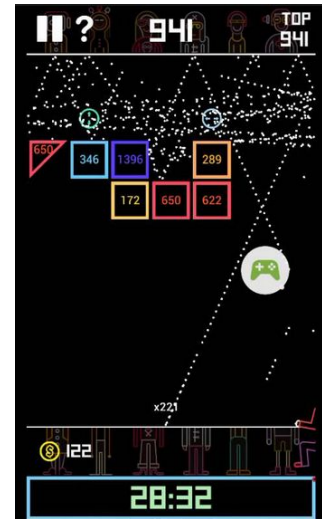


⁴⁰ https://lh3.googleusercontent.com/DFQkjf9wg7KVZNqIgGOHkvvD_v8zQmx17y2muyps4iifhZtccKrhvbm7RlalfFaVLcb6=h900

⁴¹ <http://www.coolmath-games.com/sites/cmatgame/files/2048.png>

20 - 45 minutes

A game for the long journey is something that you can sit back and enjoy, you don't want to burn yourself out for a fast pace but and not be bored by simplicity, a game that is fixed on lasting quite a long time while being satisfying to play is what a long commuter requires and ⁴² BB-TAN is a great example for this, this game involves balls being short a geometry objects, and you have to score as much as possible within 30 minutes, the timer itself help show the game is made for long commutes



The Game Industry

Developers

Developers require an audience to make a game, that obvious but it's not just cheering and attention they need from the audience by to have them as an interactive community to where they can help forge the game as well as the developers, most successful games are built of solid communities supporting them and nothing will change that.

Publishers

Publishers require the audience to speak up, to tell them what they are looking for in the next era of games this year so the publishers can take the role of getting the developers who can produce their demands of a game and make it possible to have these games come out. Publishers are the key to the AAA games and their releases and if one Publisher makes a mistake the others will swoop over to take their Audience. A example of this was the recent Call of Duty Infinite Warfare (Futuristic Era) vs Battlefield 1 (WW I ERA) at the time of these games the crowd of players were really interested in past events rather than future, this mistake caused activision (creators of Call of Duty) to suffer dearly as their playerbase moved to the game that met their requests at the time.

⁴² <https://i.ytimg.com/vi/eTc0IsfEMIQ/maxresdefault.jpg>

Conclusion

When it comes to making a game, it needs to have a clear path and a set of rules, a real game is never formed from the developers alone but communities that drive them, though as an indie, you will need to do more as by the start you won't have a community to drive it. Developing a game is as important as knowing your audience and understanding the players that will be behind your chosen genre, while making sure the game targets the right type of players, that be Competitive to the Casual players. Most games now is better with friends and with more and more interactive technologies the bridge for more multiplayer intensive games are coming alive such as Star Citizen. Many games do get it rough with people who don't play fair and still up to now there's no way to stop every hacker, it's up to getting the right set of players who would have the 'honor' of playing fair.

Technology is making a massive drive into the changes in gaming with games now getting demands for more from its audiences such as Wide-screen and 4k Support while also having a way to play in my chair with a VR Headset and mainstream hardware manufactures being called upon every moment to raise the limit in current high-end PC performance possible for the consumer by the PC Extremists. Hardware aside when it comes virtual does many games provide 'near-realism' in terms of functionality from perfect breaking walls to simulating spaceflight.

For the developers, is more and more hidden potential emerging as it is becoming more and more attractive to become an indie dev, has it been possible especially on PC and Web with the thanks for Open Sources are extremely cheap software to get into the works of developing and Mobile also being fairly attractive. While for the Players does the trend in games change and now with the sea of indie devs can many deliver, the gaming industry is becoming more and more flexible and for the mainstream gamers on console wanting to get in on more games on the open source platform of PC and Web has cheaper and cheaper PC components thanks to AMD's very recent Ryzen line-up made it that much easier.

To finish with that the changes in the gaming industry has bridged developer and player that much closer is improving how all the players are now getting their 'perfect' game and developers getting their desired community.