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Advanced digital gaming/gamification technologies

Gamification of Prosocial Learning

for Increased Youth Inclusion and Academic Achievement

D1.1 Market and

Competition Analysis

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List of Abbreviations

Abbreviation	Description
EC	European Commission
CASEL	Collaborative for Academic, Social and Emotional Learning
GBL	Games based learning
OEM	Original Equipment Manufacturer
SaaS	Software as a Service
VAR	Value-added reseller
ARG	Augmented Reality, Alternate Reality
MMOG	Massively Multiplayer Online Games

Executive summary

This document analyses a number of relevant markets in order to draw insights for the development of the ProsocialLearn platform.

The entertainment videogames sector

The entertainment-focused videogames sector is a mature, important and growing media sector. The offline retail sales of games are falling but the digital, online and mobile revenues are growing and business models are evolving. New technologies and platforms such as smartphones and tables have brought in new consumers and created opportunities for new producers and intermediaries. Analysis of the value chain reveals a number of players who have relevant expertise:

- Content developers and producers – highly creative small development studios across Europe
- Middleware and software providers
- Publishers
- Distributors

Trends within this market suggest a number of opportunities to consider. There is increasing expertise in the entertainment market developing games for PC and online and overall the skills clearly exist in the entertainment sector to contribute to prosocial games. Development of middleware technologies enables smaller developers to produce high-quality games. Online gaming is bringing a social dimension, opening up new avenues for social interaction. The risk of mobile makes it easier to develop games personalised to an individual's needs and abilities.

The serious games sector

The serious games sector is smaller and differs significantly from the entertainment games sector. Though still evolving, with much experimentation it is already focused on games for education and the 'greater good'. Unlike the entertainment sector it is not uncommon to find a single player who operates along the value chain from development to distribution within a particular sector. Players in this market do not always have strong expertise in game development and quality has sometimes been criticised.

There are interesting insights from this sector too. Middleware is again important as serious games are often being developed on low budgets or in collaboration between domain experts and designers. There is a clear need for market building to develop commissioner demand. However product quality is improving and there are opportunities to capitalise on this and build scientific rigour further.

The digital games for education sector

The use of digital games in the education sector is one of the oldest applications of serious games. Historically, few commercial companies have been involved in producing good quality games though changing business models for distribution are now improving product quality. Games in schools are used in mainstream classrooms, for specialist support and to support innovation. They can be used at home or in school so commissioners span the range from parents, through teachers, school leaders up to Education Authorities. Whilst the use of technology in schools is increasing there is still high variation and at best half of students across the EU attend a highly digitally equipped school.

There are practical barriers in schools that will need to be considered. For example, understanding of and competence in increasing social skills, technological barriers, links to curriculum and support needs.

Implications for ProsocialLearn

The market for digital games to develop prosocial skills is nascent. Insights from these related markets have been used to understand demand and market failures and produce an initial assessment of strengths, weaknesses opportunities and threats. This has advanced understanding of how to support the development of social skills that can help children succeed in life and work.

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1 Introduction

This section provides detailed information about the purpose, scope and structure of the document as well as the intended audience of the document.

1.1 Purpose of the document

This background document has been prepared as part of the research line for inclusion in the Task1.1 documentation within the Work Package 1 ProsocialLearn Game market Analysis, Exploitation and Business Modelling. The document is based on on-going research on the market potential of digital games for the development of prosocal skills. The overall objective of the document is to analyse the market structure and competition and analyse the potential positioning of the platform.

The document explores the markets related to digital games and prosocial learning, including:

- Various typologies of digital games.
- The Technological platforms available.
- Current knowledge of the market diffusion and adoption.

It will explain both the leisure and serious games industries as both produce products and services that could have application for the acquisition of prosocal skills and the prevention of social exclusion.

It summarises an initial analysis on the strengths, weaknesses opportunities and threats.

1.2 Scope and Audience of the document

The dissemination level of this document is public. As well as synthesising evidence for the ProsocialLearn project team it will be of use to other parties interested in participating in, or stimulating the European market for social games. It will also be of use to researchers analysing the entertainment games market, the serious games market or the digital games in education market for other applications.

1.3 Structure of the document

The document contains the following sections:

Section 1: Introduction – an introductory section, i.e. this present section, which describes the main purpose of the document

Section 2: Background – summarises the rationale behind the ProsocialLearn platform and the key players who will engage with the platform

Section 3: Focuses upon the structure of the traditional leisure-oriented videogames industry and market, and its rapid transformation towards new markets reached through console, tablets, mobiles and online platforms.

Section 4: Presents an analysis of what has been termed the 'serious' digital games market and industry and additionally discusses the evolution of the 'serious' digital games sector and the changing innovation landscape. It also offers an outlook on prospective developments of the digital 'serious' games industry and market, challenges faced and implications for the development of the ProsocialLearn platform.

Section 5: Presents an analysis of the market for digital games in education and the market for games to develop prosocal skills. As the market for digital games to develop prosocal skills is

emerging it has been necessary to explore these two related markets in order to gain insights to barriers and opportunities.

Section 6: the barriers and drivers in the market from the technological, supply-side capabilities, demand, societal and educational point of view are considered in this section

Section 7: Summarises the strengths, weaknesses, opportunities and threats identified throughout the analysis and information presented.

2   Background to ProsocialLearn

2.1   Rational of ProsocialLearn – Market conditions

2.1.1   Market need

Social exclusion is a key concept in Europe social policy, and both the Europe 2020 strategy and the Digital Agenda for Europe aim to ensure greater social cohesion and employment. Support for disengaged and disadvantaged learners, enhancing their employability and integration into society is a key. This includes helping people with learning disabilities, and young people to be more employable. Children in danger of social exclusion, showing little to no signs of empathy and high levels of aggressive or anti-social behaviours should benefit from digital games tailored to teach prosocial skills that can help them achieve academically, appreciate team work and recognize the value of understanding other people's needs. However, current digital games targeting the education sector are low quality and fail to capture the imagination of players, significantly reducing their effectiveness.

2.1.2   ProsocialLearn solution

ProsocialLearn will therefore establish a new market for digital games aiming at increasing social inclusion and academic performance. Through a multidisciplinary collaboration between industry, researchers, psychologists, pedagogists and teaching professionals, it is envisaged that ProsocialLearn will deliver innovations that engage children and stimulate technology transfer to the education sector.

2.2   ProsocialLearn stakeholders and target market

2.2.1   Stakeholders

There are a range of stakeholders who could benefit from the project. These include:

- SMEs from the traditional games industry who will have the opportunity to exploit new markets
- Serious games companies who can access new tools
- Researchers, psychologists and pedagogists who will have an interest in the advancement of research into prosocial games

2.2.2   Target market: who is going to pay for ProsocialLearn

Commissioners or purchasers at a range of different levels could pay for ProsocialLearn products. These include:

- School leaders: The majority of ICT education resources are devolved to schools so Head teachers and Heads of ICT will be key decision makers
- School networks: In some countries or regions, networks or chains of schools commission resources on behalf of the institutions they represent
- Education Authorities: Whilst not the norm there are examples at national and regional level of Education Authorities commissioning specialist ICT support for schools
- Parents: Parents who are highly engaged in their children's education may be prepared to pay for software

2.2.3   End-users (teachers / parents / children)

End users could be game facilitators or games players. Game facilitators incude:

- Teachers: many resources to develop social skills are delivered by class teachers in a mainstream setting
- Specialist staff: some interventions to develop social skills will be delivered in a small group or 1:1 setting by specialist staff, who may work across groups of schools
- Parents: May work with their child on educational resources in the home. Their engagement is a strong predictor of educational achievement but varies significantly.

Game players could include:

- Children at risk of exclusion – the target group for this project
- Their peers – who may also be engaged in games to develop social skills and modelling

3 Overview of the entertainment-focused videogames sector

This section aims to help understand the economic, industrial, and technological supply factors that can be harnessed to provide the tools and expertise necessary to develop and exploit prosocial games. The entertainment games sector has been considered separately from the serious games sector (considered in section 4) because the sectors have very different structures, players (on both supply and demand side) and applications. However both sectors contain important insights for the development of the ProsocialLearn platform.

3.1 Market Overview

When exploring the supply side potential for a targeted digital games platform, the obvious response would be to turn to an industry that calls itself the 'digital games industry'. Unfortunately this term is almost unused and separate in regards to the different companies that specialise in the many different forms of games and entertainment - where the definition of the type of firm that produces digital games is not always straightforward.

Various industry groups and trade associations use terms such as "entertainment software", "electronic entertainment", "interactive entertainment", "videogames", "computer games" as formal titles or sector designations, but almost each of them refer to the "videogames industry" as a whole. This term will therefore be used in this part of the report to refer to the industry that primarily supplies the consumer leisure market with interactive entertainment products that are both commonly referred to or recognised as videogames.

Using the term "games" for the leisure market or entertainment market to contrast with the essentially non-leisure markets does largely address this, although for example, education, and edutainment have always been a market for the games industry. This "videogames" industry is an ecosystem of hardware, software and online platform providers, game developers, publishers and other service providers drawn from the interactive media, software and broader industry that facilities the mainstream leisure market in games, and covers many types of varied companies and professions.

However it must be observed that the videogames industry also overlaps with a much larger industry of interactive software and media, video, animation, internet services, e-learning and educational software firms that operate in a wide range of markets to produce interactive software and content that are often game based, or used within games. Acknowledgment of this industry is important, as there is also a broader set of firms that may play a role within the prosocial games market. Here for example the rise of the app market as introduced by both Apple and Google which are aimed toward the consumer and leisure market and who are clearly blurring the perception that entertainment software is labled as simply games, and is produced by the "games" industry.

Digital or videogames have become established as an important media sector over the last 30 years, with the market being built on numerous proprietary consoles, tablets, mobile devices and handheld devices - of which more than 600 million physical units have been sold since they were first launched in 1977, as well as the plethora of games being available for home computers. More than any other area of this industry, the games industry has utilized the interactive multimedia potential of available technology, which in turn has allowed the creative development of a selection of new media forms, and led the development towards the commercialization of software packages that are moving far beyond 'office' IT.

Market size and growth:

The videogames industry is no longer the youngest media industry, but continues to show strong growth overall, particularly exemplified by the development of social and mobile markets. Looking to the near future, there is agreement among analysts that the overall market will grow, with the off-line retail sales of games falling, but digital downloads, and online and mobile revenues growing.

The statistics below shows the value of the video game consumer market, both packaged and digitally distributed, worldwide from 2011 to 2013 and offers a forecast until 2018. The package market value in 2012 amounted to 18.4 billion U.S. dollars.
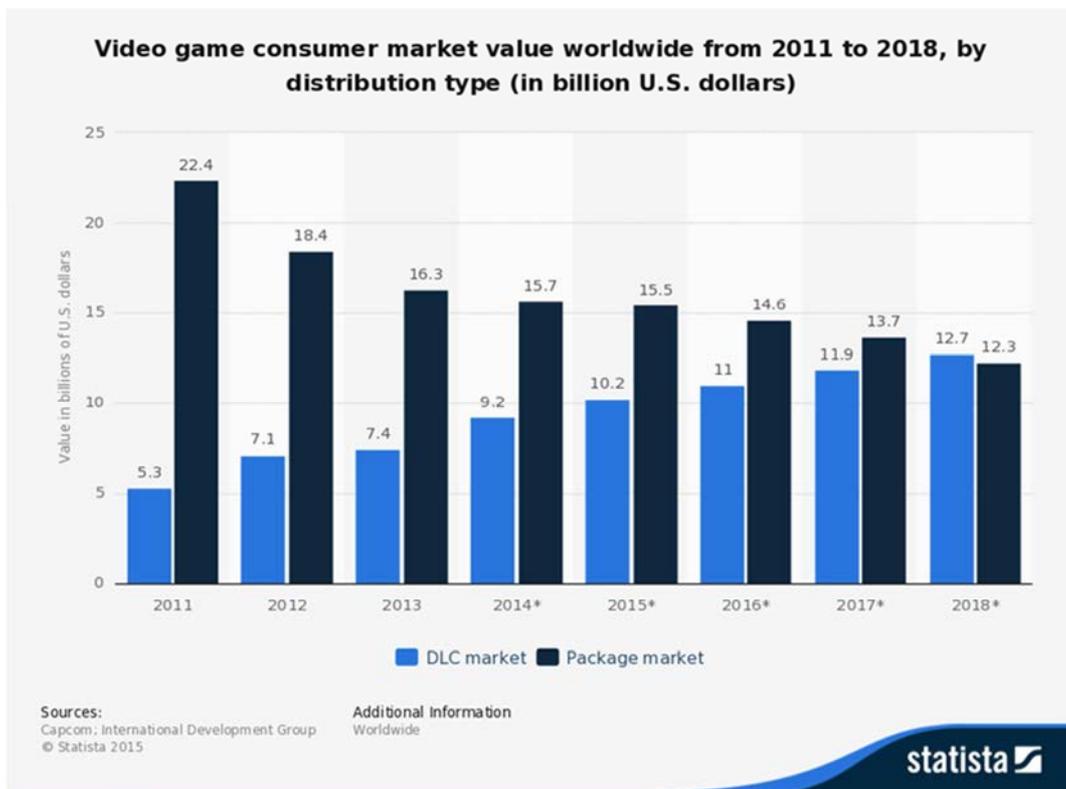
Figure 1 - Video game consumer market value worldwide from 2011 to 2018[1]

Looking at breakdowns of the U.S. video game industry (www.statista.com) also illustrates recent trends.

In February 2014, the retail revenue of the video game industry in the United States amounted to 887 million U.S. dollars. In comparison to January 2013, they grew by nine percent. Sales revenue generated by the physical retail channel contracted by 25 percent between May 2012 and May 2013, from 517 million U.S. dollars to 386 million. Both hardware and software sales lost 31 percent of their worth.

On the other hand, as might be expected digital sales have been increasing. In 2009, digital content accounted for 20 percent of the revenue and this doubled by the end of 2012. These figures show that gaming is in an advanced state of digitization.

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[1] Source: www.statista.com - Video game consumer market value worldwide from 2011 to 2018
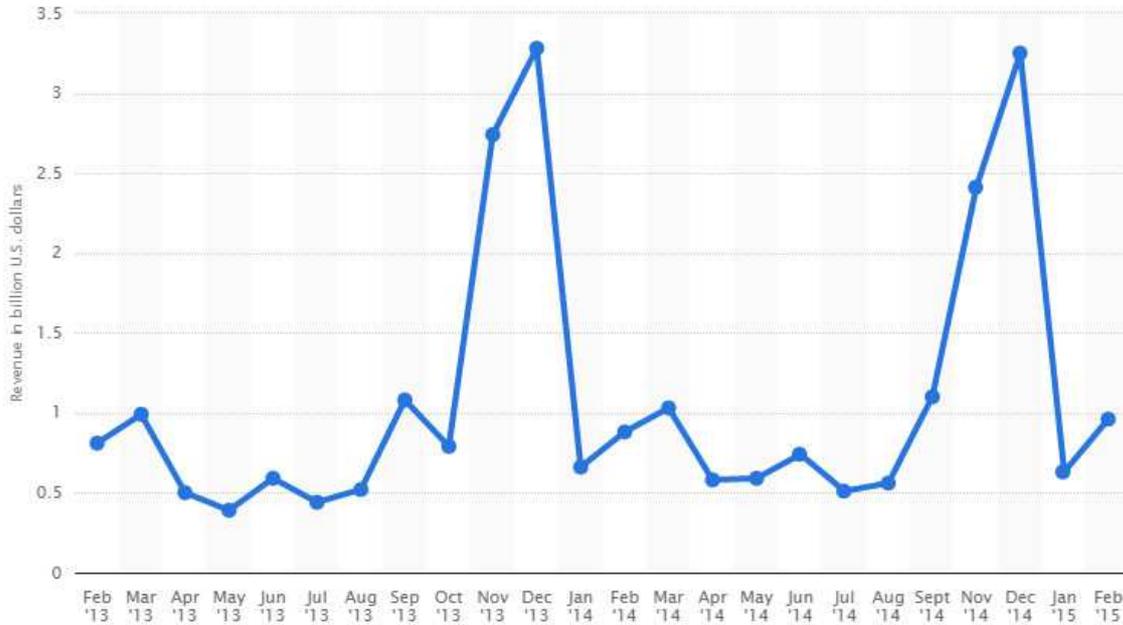
Figure 2 - Retail revenue of the US video game industry from February 2013 to February 2015 (in billion US$)[2]

3.2   Products and Users

3.2.1   Products

While digital games are computer software packages, they can both be referred to as cultural and media products - which have established themselves upon the legacy of film, graphic arts, television and literature, but present a unique dimension of 'interaction'. Here games creatively combine multimedia, narrative, drama, competition, networks, and interactivity in rich and multitudinous forms which highlight two important issues:

A. To produce these products, the digital game workforce has to be inter-disciplinary, often requiring staff with multiple skill sets, and the industry spans across both the 'technology' and 'culture media' sectors, with implications for policy support and intervention.

B. The removal of some distribution steps is reflected in changing business models from high value and high priced packaged products with high marketing and distribution costs for one-off sales, to online and mobile models that bring developers closers to consumers, where initial prices are low or even free, and complemented by new forms of income such as in-game goods, virtual currencies, subscription fees, frequent upgrades ("Freemium") etc.

3.2.2   Users

Much of the market is coming from growth in the rise and expansion of overall audiences. Digital games of all types are now enjoyed by millions of people worldwide. Children, the traditional core market are in particular high users (over 90%), but adult markets are expanding consistently.

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[2] Source: www.statista.com - Retail revenue of the U.S. video game industry from February 2013 to February 2015 (in billion U.S. dollars)

Digital games offer an alternative model of ICT use that is based on play, sociality and relaxation. So-called Casual gaming, as opposed to 'hard-core' or Core gaming markets, with their image of young men playing violent games, is capturing an up-to-now unsatisfied demand across generations, socio-economic classes and gender, and are becoming mainstream across society. US data puts female players at 47% of total game players, with adult women a major growth market and recent figures from France show a similar trend. Like use of the Internet in the early days, usage drops away quickly with age, However while many general online services now report high uptake among older people, this has only occurred slowly in relation to digital games. The strong effect seems to be the cohort of people who used games as children taking this practice into later life.

3.3   Value chain and key players

This industry covers many types of companies and professions, for example TIGA, a UK industry body which represents "independent games developers, in-house publisher owned developers, outsourcing companies, technology businesses and universities". The industry that produces digital games thus has a 'core' - the 'videogames industry', traditionally focussing around a very small number of hardware vendors, and a few larger publishers and developers, a long tail of medium and small businesses developing digital games, and an extensive ecosystem of businesses producing technologies, particular middleware, providing services such as testing, and publishing, distribution, marketing and various systems and services associated with online gaming.

This industry suffers from considerable volatility, as a cyclical industry with long development lead times, and market success shaped by 'hits'. Constant changes in technologies, and the exigencies of operating as a small company under these conditions add to the fragility of the industry. The whole industry is in a period of particularly rapid change including the arrival of aggressive new competitors from mainstream computing and internet business in platforms and distribution such as Apple and Google.

Traditionally a key asset of a developer, these technologies are increasingly obtained from specialist suppliers, commercial or as open source, of online, and 'social' and 'casual' games, and generic hand-held devices, like mobile smart phones and tablets, that have brought in new consumers and created opportunities for new producers and new intermediaries. Maturing development platforms and middleware supply, and new forms of game monetisation have also contributed to this change.

It is noted that this conventional chain model is changing with new technologies and specialisation to be more of a complex value network.

The videogames industry is made and can be defined from a number of building blocks. It is important to understand the value chain in videogames, to appreciate the complexity of the industry and the players who could contribute development and/or support:

- **Content Development & Production** - which includes publishers providing capital and IPR management, marketing, developers, animation studios and other creative teams.
- **Middleware And Software** - tools for the production of titles.
- **Publishers** – a company that publishes games that it either develops internally or has bought externally
- **Distribution** - of both digital (online/mobile) products, including the servers and network technologies, and physical distribution requirements.

3.3.1 Content Development & Production

A digital games developer is a company that invents and develops digital games, and in turn develops the necessary software to run the videogames. A digital game developer may specialize in a specific console, or may develop for a variety of platforms including the PC and mobile platforms. It can also specialise in certain types of games.

The production of videogames, as with most information, digital and creative content goods (prototypes), is characterised by high fixed costs and low marginal costs. The initial financial investment to develop the product is extremely high, and the risk is high too. Few developers can independently finance projects that may take 2-3 years to reach the market, creating an important role in the value chain for publishers providing pre-financing, and generally obtaining IPR over games in return to the long-term detriment of the developers.

Developers are usually studios, with multidisciplinary teams including various sorts of software engineers, graphic designers, animators, game designers, data analysts, project managers and business managers. Such companies are small and numerous. In Europe, a large population of these highly creative small development studios is found mainly in the UK, France, Germany, the Nordic countries and to a lesser extent in Spain.

Taking into account the specific relation of developers to publishers, and the existence of independent developer companies, some developers publish their own games and therefore can be regarded as publishers and developers. This is, for example, the case for the majority of the Norwegian developers. Being small and often young, such companies are confronted with a variety of additional managerial issues, typical of SMEs. These put a lot of pressure on the managers' business skills and consist of: unbalanced budgets and deal-flow, dependence on major customers, absence of real marketing, uncontrolled growth needs, recruitment issues, project size escalating, supplier management (need for outsourcing or syndication), etc.

However, the game development is an attractive field of work, especially for passionate gamers – combining creative work with cutting edge technology and the chance of big hits in the market. Employment can be found in well-resourced international studios, or in start-ups producing innovative or 'alternative' games, or supplying the casual game market.

3.3.2 Publishers

A digital games publisher is a company that publishes games that it either develops internally (the major publishers generally vertically-integrate many development studios) or has ordered from an external developer. The publisher is responsible for licensing the rights and the concept on which the game is grounded, for handling the marketing and often even the distribution. Publishers play a key role in financing the often lengthy and risky game development process, and the equally expensive marketing effort.

While the gatekeeper role is played by several hardware platform owners, publishers rarely specialise in only one platform, they opt for platform diversification, which has its costs due to incompatibility of hardware platforms, due to software code base or user interface. The high failure rate of games generally means that large publishers, like major film studios, are conservative, preferring franchises, tie-ins with major movies, and integrating tightly into promotional culture of mass market and commerce. This raises the importance of partner IP providers in success of the games business.

3.3.3 Middleware and software

Middleware has two separate but related meanings. One is software that enables two separate programs to interact with each other. Another is a software layer inside a single application that allows different aspects of the program to work together.

The most common type of middleware is software that enables two separate programs to communicate and share data. An example is software on a Web server that enables the HTTP server to interact with scripting engines like PHP or ASP when processing webpage data. Middleware also enables the Web server to access data from a database when loading content for a webpage. In each of these instances, the middleware runs quietly in the background, but serves as an important "glue" between the server applications.

Middleware also helps different applications communicate over a computer network. It enables different protocols to work together by translating the information that is passed from one system to another. This type of middleware may be installed as a "Services-Oriented Architecture" (SOA) component on each system on the network. When data is sent between these systems, it is first processed by the middleware component, then output in a standard format that each system can understand.

Middleware can also exist within a single application. For example, many 3D games use a "3D engine" that processes the polygons, textures, lighting, shading, and special effects in the game. 3D engines are considered middleware, since they bring different aspects of the game together. For example, the game's artificial intelligence works in conjunction with the 3D engine to create the gameplay.

Game engine middleware includes a custom API, which provides developers with standard functions and commands used for controlling objects within the game. This simplifies game development by allowing programmers to use a library of prewritten functions rather than creating their own from scratch. It also means 3D engines can be used in more than one game.

While European players are not present in the manufacturing of console and handhelds hardware, but are part of the games development market, there are still a number of other technological and system components where there are European players present. The development of games also requires high-level tools and applications for developers. Technology companies can also provide the platforms for distribution to developers and publishers to run themselves, rather than offering them as services.

This reflects the changing specialisation of the industry in services, technology, testing, and marketing and distribution, away from previous approaches taken. In this richer ecosystem, Europe has an enviable range of actors, and opportunities to improve its position, particularly in growing online and mobile game developers, middleware, monetisation platforms and tools for game developers and production services.

3.3.4 Digital Games Distributors

Distribution traditionally controls both the marketing and distribution of physical products of the games industry. And also oversees packaging and transport, organises the infrastructure for distribution, and sometimes even provides some user support. Together with the retailers, they cover the physical logistics of the distribution chain.

Though they are not the publishers themselves, they are usually specialised distributers for digital games (and often other digital products). In particular, as large publishers are primarily interested in

promoting their own games, independent game companies find small specialised distributors for their titles. Finally, retailers, which sell directly to consumers.

Some of these retailers play the role of distributors and contacting videogames publishers directly. As mentioned above, this established value chain is changing, with the roles and position of distributors, retailers, developers and publishers changing, with varying impacts on business models, types of products and services available and the innovation process.

The rise of digital distribution, is growing fast, and changing the balance of power of sectors involved. A growing number of new online distributors have emerged, which have positioned themselves in the videogames value chain as videogames publishers and developers go more progressively online and mobile. Some developers, such as Valve software, have developed proprietary online distribution platforms such as the Steam network.

Alternately, dedicated publisher/distributors are also growing in this area, where social networking systems allow developers to reach end users by directly using platforms such as the App Store and Google Play. These new markets often combine both the distribution system and the game platform monetisation and marketing.

3.4 Technology and platforms:

The consumer market has primarily been conceived in terms of the devices that run the games, as these have shaped the distribution, game forms, user segments and integration of industry value network. An introduction and comparison will now be given to the main devices-focus sectors:

- PC Market.
- Handheld/Console Market.
- Online Games Market.

3.4.1 PC Market

The PC-based Digital Games market is smaller than the market for dedicated gaming devices, but has played an important role as a more 'open' platform where imaginative programming and risk-taking perform best since developing for dedicated game console has long required specific tools and publishing agreements with major vendors. The PC game market is not so clearly defined as the console market, as figures on the PC games market in terms of units of games sold are difficult to collect, due to the large number of producers, the loose linkage with the hardware architecture, and to the much more fragmented market in general. However, figures on three of the leading games, namely The Sims, The Sims 2 (social simulation games), and StarCraft (Strategy game), which shipped respectively 16 million units, 13 million units, and 11 million units show the scale of the market.

The Call of Duty franchise of games has sold over 100m units. Traditionally, the PC platform has lower entry barriers than developing for the restricted proprietary platforms which have often required payment of licensing fees, and also benefit from lower development costs (no need for specific –and highly expensive software development kits, very low costs of duplication and deployment).

However this is no longer the case, as proprietary platforms today are much more open to developers, although still not completely open. Nonetheless, as a platform for developing and distributing low-budget games that characterise specially-made games for empowerment and inclusion the PC is the lead platform. The PC platform, as a gateway to the Internet, dominates the fast-growing online game segment (both client based and browser-based games), despite the

adaptation of dedicated consoles and handhelds (e.g. Nintendo DS), and general purpose wireless handheld platforms such as tablets and smartphones (primarily Apple iOS and Android). Overall the PC and emerging general purpose online platforms like smartphones and Social Networking Systems provide an increasingly stable environment in which to operate.

3.4.2   Handheld/Console Market

For many years, dedicated handheld digital game systems have represented a market exclusively devoted to young pre-teenagers, offering limited-complexity games. This market is dominated by the almost monopolist Nintendo, which has sold over 300 million handheld devices since 1989, and continue to have strong sales of the latest 3DS units despite overall losses. The definition of a handheld market is being radically changed by the general purpose handheld platforms now available.

The oligopolistic position of hardware platform companies in dedicated handheld and console segments is evident from the above figures. The reasons can be identified as the high market entry costs related to technology, distribution and the investment needed to develop prototypes. The most relevant fact in both markets is related to the proprietary characteristics of the devices: each manufacturer defines the technical features and characteristics of its device and the technologies adopted. The console and handheld game markets have revolved around the release of new consoles which set the baseline capabilities for the game developers and attractiveness to consumers. The competition between vendors has brought a range of new technologies to the market over the years, including high quality 3D graphics, and motion sensor interfaces – innovations that were hardly available on PC platform.

Gaming devices are sold at a loss by vendors, in an attempt to build market share for games and deliver a large consumer market. This also allows developers and publishers to achieve rapid sales, and stimulates a good selection of games for the console to attract those consumers. However, it is increasingly easy to develop games that work across platforms, thus undermining the distinct dynamic of the industry.

In the UK over 90% of children in families of all social groups own at least one video game console. However, children aged 5-15 from AB households are more likely to use the internet at home (89% v. 69% for children from DE households).

With the console market, both hardware and software depends considerably on the release of new consoles by Nintendo, Sony and Microsoft. These are expected to be increasingly general purpose multimedia devices with capabilities that link to mobiles, tablets, computers and the internet. The general-purpose platforms, such as smart phones and smart TVs now bringing innovative interfaces and modes of interaction to an even wider market than the games devices, somewhat denting the innovative edge of these devices. Today the most important developments in gaming platforms and markets are occurring elsewhere, online, in network technology, and on these general purpose mobile phones and tablets.

3.4.3   Online Gaming

A major change within the digital games industry undergoing is the move to exploit the internet itself as a gaming platform, a move collectively defined as online gaming. These online games can be segmented as single player or multi-player which are connected remotely or by local network. Multiplayer computer gaming has its roots in the earliest days of multiuser mainframe computers,

where users played against each other or collectively in simple game 'environments', a phenomena which developed on networked computers as Massively Multi-player Online Games (MMOG).

The analysis of the contemporary online games world is rather complex, with the simple dimensions of earlier generations of games, where modes of use and interaction and analysed across technical configurations that not only change the possibilities of game play, but also change business models of producers and various intermediaries. One categorization distinguishes client-based online gaming, where the end user installs (and generally buys) a specific program that provides the interface and interactions with the game servers, from browser-based gaming, where games can be downloaded and played within the standard browser.

Much of the analysis of multi-player games focuses on the 'social' aspect of gaming, where play with and against other people, with all the complex motivations and interactions this entails offers much space for interpretation and innovation.

The market is considerable, growing, and demanding innovation in technology, service delivery and business models that stresses the existing industry and is opening many opportunities.

3.4.4   New handhelds and mobile gaming

While Nintendo was almost unchallenged for over a decade in the market for handheld games, which in European and North America were largely used by a juvenile audience, the development and mass market adoption of handheld devices originally conceived for completely different purposes – mobile phones and tablet computers has completely revolutionized the industry and the market for digital games in a portable, personal format.

This new market is widely referred to as 'mobile' gaming, though some refer to it as 'wireless' gaming. The contemporary mobile game market has evolved rapidly from early embedded games and mobile operator walled gardens, with multiple platforms and a fragmented market to the market pioneered by Nokia but created by Apple with the development of the iPhone, iPad, the App store and most recently the announcement of their iWatch products. Apple essentially introduced a novel general purpose handheld platform with a variety of network connections, and a powerful distribution and publishing mechanism to facilitate revenue collection and control of intellectual property. Apple also broke the control of the mobile operators over the end-user terminal.

The combination of new possibilities in the handset (touch screen, motion sensor, precise location system, enhanced display, large storage capacity, high-quality audio, and embedded camera) and the ubiquitous connection to the network allowed many innovations, including application stores, playing on-line while on the move, multi-player games, playing across several media using social networks, games linked with device motion, augmented reality and location-based gaming.

Recent movements in this area have brought significant innovations in business models to the market with experimentation by mobile operators and games developers. There are strong mobile-only games developers (often acquired by major game publishing houses), and a rapidly growing market and proliferation of innovative and creative products. Browsing from mobile devices and downloading from application stores are becoming the standard way to consume mobile games, with many games offered in basic version for free, and full version for a few Euros. With the diffusion of handsets and the increasing affordability of mobile data plans, the mobile platform reaches wider audiences.

Growth in smartphone and tablet use offers significant opportunity for the adaptation of existing games and the development of new types of games. The arrival of the tablet format has amplified

this exponentially. Mobile devices have now become the fastest growing gaming platform. In addition to this broad market base, mobile games can make intensive use of the competitive advantages of the mobile-phone platform, such as complete ubiquity (availability at anytime and anyplace), the highest level of personalisation (while maintaining close contact with social networks), and, looking into the future, context awareness (with location as a current and main example).

Therefore, the mobile gaming scenario is no longer that of a delayed or modest extension of console or PC games. Rather, mobile gaming is a distinct user experience with a number of unexplored avenues.

4   The non-leisure digital games market: "Seriousgames" and "Gamification"

4.1   Market Overview

Part of the broader ecosystem is a newly emerging 'serious game' industry, which is starting to carve out a distinct identity. The 'serious game' research community has produced a label that firms from interactive media and various sectors such as e-learning, defence and health care are now using. The aim of this is to align themselves and create awareness among potential clients, professionals and government that there is value in associating a set of emerging markets and firms and recognise the particular strengths of using the digital games in applied applications.

Compared to the mainstream videogames industry, the serious game industry is much smaller and more loosely defined. It is still closely associated with research and experimentation despite rapid growth in some markets. The leisure-market videogames industry often dismisses the 'serious' game industry as irrelevant, and the so-called applied games they produce as not the 'real thing'. However this is probably a passing phase: the videogames industry is already in turmoil from new technologies and markets, and as firms start to produce game-based or like products and services for professional and leisure markets, then the distinction is likely to erode.

4.2   Products and Users

Outside of the government, there is a growing interest in games for education, professional training, healthcare and wellness, politics and activism, advertising and public communication etc. A relatively small number of specialist firms produce products for a growing market in a variety of segments such as the defence industry, games for health, e-learning and communication/advertising games etc, each of which has its own dynamic.

There is not yet any clear agreement on how to categorise serious games. The categories used have included

1. Sector in which they are used,
2. Issues they address
3. Means that these are addressed by a game
4. Type of game genre or configuration used.

Sector and issue have been deemed the most relevant for this analysis. Examples of sectors include:

Games For Education: This market is considered in more detail in the section below considering the potential market for digital games to enhance prosocial skills

Games for Health: Games in the healthcare sector cover a range of different applications from professional training to disease management to patient education to lifestyle improvement. Advances in technology and increases in patient expectations are helping to drive the market for wider applications of gaming technology.

This sector also covers a range of business models. Individual patients as well as institutions and governments pay for games that aim to increase health and wellbeing. The potential for goal setting, data capture and reporting is opening new possibilities.

Games For Good: For the Association of Serious Games, "games created for this segment of the industry hope to teach, train or simply generate awareness of a topic, an issue or a societal problem, therefore creating change – in thinking, actions or attitudes". Games for change/good where the

'Activist' wing of serious games is less concerned with business, and more with social change or social benefit, explores the use of games to raise awareness of political issues among the public or political leaders, build community participation, or support behaviour change on topics like energy consumption. Games can be 'serious' as in 'serious' cinema, addressing important social issues, or entertainment that engages people in constructive activities.

It is evident that both Governments and NGOs are ready to pay for the development of Serious Games in the same way they have invested in their communication campaigns. Games for Good provide an entry point for all sectors, as they can also be used as a strategy for companies to reach their audiences (e.g. energy company promoting ecological messages). The application of Serious Games in the Games for Good market will trail the development of standards and assessment strategies in the other markets.

Games For Military: The first digital serious game is often considered to be Army Battlezone, an abortive project headed by Atari in 1980, designed to use the Battlezone tank game for military training. In addition to the high cost military simulations and virtual reality commissioned by the military, the US government and military have periodically looked towards game developers to create low cost simulations that are both accurate and engaging. Game developers' experience with gameplay and game design made them prime candidates for developing these types of simulations which cost millions of dollars less than traditional simulations.

Games To Advance Research: There are also a range of products offered as 'serious games', and which have no game-play elements, but exploit the technology of videogames, such as 3D engines where products have engaging the look and feel, and interaction possibilities of videogames. These nevertheless are one of the most important features of the serious game landscape. Much serious game activity is generated by the research community, where research focuses on new technologies, experimental implementation and measurement of impacts, especially in healthcare. In research, a much broader range of approaches is often captured under the rubric of serious games than just the production of specially-made games, such as attempting to understand how digital gaming practices can harnessed and expanded for applied use.

Gamification: Gamification is the application of typical elements of game playing (e.g. point scoring, competition with others, and rules of play) to other areas of activity, typically as an online marketing technique to encourage engagement with a product or service. The worldwide gamification market has been growing and there has been a lot of excitement about the potential these techniques bring to existing channels. According to one Gartner report, by 2015 more than 50% of organizations will gamify innovation processes, and more than 70% of Global 2000 organisations will install at least one gamified application. However, as the initial novelty and hype around gamification wears off, the next generation of applications must prove they can really meet business objectives.

4.3 Value Chain and Key Players

The serious game industry is polymorphous as it groups together all the niche areas and markets that employ videogames for objectives other than pure entertainment. For this reason value chain is perhaps not as clear as the conventional videogames industry (which in itself is also becoming more complex). It also differs significantly from the traditional gaming industry and is going through considerable evolution.

4.2.1 Key players in the value chain

The value chain in digital serious games broadly covers the following groups:

- Developers
- Publishers
- Distributors and procurement
- Promoters and investors
- Intermediate players
- Other media companies

However, these categories are not always distinct and clear-cut. Currently, it is quite usual to encounter a single player that takes care of the development, publication and sales of the games it produces. Effectively, more than half of the developers also publish and provide access to their games. This is more evident when games are based on web or mobile technologies that can be directly accessed by users.

Developers: produce the content of serious games, or tailor them according to the B2B, B2C or B2B2C segments. Currently, in the United States and Europe, these tend to be SMEs or VSEs/freelancers and are generally serious game "pure players". They do not usually have a video game background, but have worked in the promotion, development or publishing of professional software. They can also come from the animation, and general media production industry, e-learning or even pharmaceuticals.

Publishers: cover the costs of publishing, marketing and packaging serious games, both for physical and electronic sales. This group also includes developers/publishers that produce their own titles internally. There are currently no serious game "pure player" publishers due to the diversity of applications. Intermediaries who play the role of publishers can be established players in e-learning and education publishing, and healthcare systems and services.

Distributors and Procurement: digital serious games often do not follow traditional retailer-based distribution models. The principal customer of the game may act as distributor to final users: the American army and NSA for example distribute certain product directly to the public. Most titles are distributed via the internet, with electronic sales of serious games dominating. Distribution in many sectors in the area of serious games is shaped by public and private procurement processes that distance the end user organisations from the process, making the procurement agencies the key distributing agents. Distribution models include (Alverez 2012):

- **A Business market (B2B)** for example, training products (corporate, defence), professional health products.
- **A direct to Consumer market (B2C),** such as educational and wellness products.
- **A Business to Consumer business, market (B2B2C),** providing platforms and products for other organisations to supply a consumer market (public health, military recruitment)
- **Free-of-charge distribution:** essentially based on web marketing, this approach employs all the various marketing strategies used online.
- **Semi-free-of-charge distribution:** Using the freemium model, characterized by bonus products, demoware, shareware and trialware, and virtual communities.
- **Commercial distribution:** made up of electronic and physical sales, as well as use in restricted areas. 51 However, for much of the industry, the delivery mode is not key to reaching the market, since the games are developed on a project basis for particular clients.

Promoters and investors from the private, research and public sector that provide supply-side investment to develop capacity, products, tools and evidence to kickstart the nascent market. These include universities, public authorities, public and private research funders, schools or continuing

education establishments, companies that manage their own in-house training, etc. They are contributing their expertise and/or monetary resources to serious games and are therefore the driving forces behind the sector's current momentum. For researchers, this sector is opening up a sizeable field of investigation that is capable of creating more direct gateways to businesses. University research therefore combines technological problems with concrete applications, with the support of private sector companies as part of collaborative R&D projects. In some cases, these projects are supported by existing national schemes (the Small Business Act in the United States, ANR projects in France, for instance) or more recent dedicated programmes – one example being the call for serious game proposals that was issued by the French Ministry of the Economy in 2009. Serious games are thus both a lever for cooperation between research and enterprise and an outlet for applied technological innovation.

Intermediate players, and especially marketing agencies and media companies, who are likely to either produce or commission a serious game,. They can also be involved in the development side by becoming a serious game publisher in a particular segment, especially information, communication, training and teaching or instruction. Intermediate players, notably ISPs and consumer electronics manufacturers, are in a position to preinstall applications on the devices they sell or put into users' homes.

Other media companies – Media companies are increasingly commissioning 360 degree programming, with TV, online and other interactive such as games. Aware from pure entertainment programming this can include the commissioning of games. In particular, this can include public sector broadcasters, such as BBC and Channel 4 in UK with a mandate to produce public-interest media in a whole range of education and public-interest topics, and are commissioning interactive material as part of the move away from pure television and radio.

4.2.2   Models of production

The IPTS Expert Workshop, and the DGEI State of the Art report (Bleumers, 2012 identified three main modes of production and connection between developers and users:

1. Product approach
2. Project approach
3. Research-led

4.2.2.1   The product approach

It applies where a developer creates a product that can be sold or distributed in a market, a more conventional value chain model.

4.2.2.2   The project approach

It applies when a network or consortium of organisations work together to develop a product, service expertise and the use of the product or approach, usually by some of the partners. Value is brought by all actors, but direct financial gains only by a few. In addition, many serious games projects are situated in research contexts, so a final mode of development that can be identified is the Researched innovation and implementation a type of project approach that is includes development of digital games, but where a research agenda dominates, and the primary output may not be digital games used in practice, but research knowledge related to the application area, or technologies and techniques are tested in the project.

While there are product-based markets, a large part of the serious game business is in the project market, with orders coming from key accounts. These are generally co-production projects, where the commissioning organisation can be exploring the use of digital games, and is developing their knowledge and practice in digital game use. Here we can identify three modes of business.

- **The order-based model** is where a client contracts a business of some kind (though not a private individual) to design and develop a serious game. This is then used exclusively by the client.
- **The licence-based model** is where titles produced by any kind of publisher, company, independent, association or public or private institution (though not a private individual) are made available for a fee. The application is either a ready-to-use serious game (customized or non-customized), a piece of development software to produce a serious game, or a serious game integrated within another application or product.
- **The consulting/training model** is where a public or private institution's designers/developers are trained in all the different stages of serious game and gaming development on-site. This can involve not only the development of a specially made game, but also the development of practices in which it can be used most effectively.

These will often be done in partnerships with other public, research and private organisations. The project mode of work dominates largely due to the emerging nature of the use of digital games, and the specialist nature of many of the applications. Each project is an experimental process, where the developers are learning about client needs and the potential for games in the particular application, and the customers are also exploring the potential of games, the impacts they can have, and how they can be deployed. This can be a long a risky social process, raising the barriers to entry by developers and user organisations. As with mainstream games, and any risky venture, intermediaries such as publishers or other organisations, including government, that can provide resource input, both financial and knowledge, and broker and manage innovation can support the process. For the future, the IPTS Expert workshop emphasised that to build a sustainable business model a serious game provider must build reusable resources, and not enter into new projects with a blank slate. Multiple sales are required, or repeat use of a generic platform, a game engine, techniques, assets etc. generated in project based work. For as long are markets remain dominated by one-off experimental project, developers and publishers will be unable to develop sustainable business.

4.2.2.3   Research-led innovation

A final model of development is research-led innovation and implementation, still one of the most significant forms of activity in the field, where partnerships of end user intermediaries, technology firms, games developers and other specialist organisations work to implement serious gaming in a specific context. In this case the challenge building long term sustainability of the products of a research project is not only to achieve successful local implementation, but transferable knowledge and technologies that can be reused by partner organisations in other situations. Public and private research funding organisations play a key role in this type of project.

4.2.3   Supplier characteristics and trends by sector

Due to the complexities and continuing evolution of the Serious Games value chain, the characteristics of supply-side organisations and emerging trends tend to differ by sector. He we examine value chain characteristics within the following sectors:

- Health and education

- Corporate and Government
- Advergames
- Games for Good

4.2.3.1 Healthcare and education

Previous analysis of the Serious Games value chain focussing on the healthcare sector has identified three key trends and observed that the education sector follows similar patterns:

1. Most games are for pure research purposes and are not a complete product/service yet. In general, governmental agencies use those games for public benefit.
2. Roles in the value chain are not realised separately but are merged and managed by one actor. Companies often seem to do both development and distribution of their own games.
3. Distribution physical supports are being replaced by online distribution or by SaaS models.
   - Contributors in these sectors tend to use the internet to distribute developed SG games for PCs or mobile devices.
   - In the Education sector, companies tend to sell their games through publishers.

4.2.3.2 Games for good

This is a 'horizontal' rather than a 'vertical' sector and companies operating in this sector will typically operate in other verticals e.g. education, corporate. A small of companies, all SMEs, are specialised in this sector. The rest combine their services developing games for good and advergames or work for the Media. The main producers of Games for Good are non-for-profit organisations.

Few companies highly involved in the development and distribution of serious games in the 'Game for good' sector operate in this sector exclusively. They tend to diversify and probably develop games for good only occasionally. There is no pattern indicating that they develop mainly their own games or that they develop them for third parties. However research shows that most companies both develop and distribute games for good.

4.2.3.3 Advergames

Most companies involved in the development and distribution of SG in the 'Advergames' horizontal sector operate in more than one other sector. There are no notable trends within this sector except for a slight tendency towards the development of tailor-made games.   However there is no overall pattern indicating a strong tendency of companies operating in the Games for good and Advergames sectors towards developing games for the masses (off-the-shelves) or towards developing tailor-made games.

4.2.3.4 Corporate and Government

The number of companies found operating in those sectors exclusively is lower than sectors such as health and education.

4.2.4 Geographical distribution

A recent analysis of serious games companies (Gala_DEL D4.3) found that the US had the largest share of these companies. However half were still from European countries.

The European market is younger than that of the United States, and it is principally driven by the UK, Scandinavia, Germany and France. However the number of companies identified in the Netherlands, Germany, Belgium and Spain has increased.

There is little political support in Europe to help develop the market, though there are a number of local and regional initiatives aimed at accelerating progress.

4.3 Technology and platforms

4.3.1 Publishing, distribution, procurement and platforms

Where there are serious game products, then online distribution and use can follow and build on the platforms used in the mainstream media and games market, including the general purpose mobile platforms and social media systems. However the 'serious' use of games depends on market intermediaries and distribution platforms in particular markets of use, and the requirements for online platforms in domains of use where security and privacy are of much greater concern than in consumer markets.

Distributions of products and services in healthcare and education typically depends on large contracts with approved suppliers and formal tendering processes that might be out of the reach of many smaller developers and even publishers, especially in emerging markets.

4.3.2 Technology

New technologies can be incorporated following the mainstream market, but the certain serious game markets, notably defence and health care, may also provide opportunities for new technology implementation, such as advanced AI, emotion recognition, etc. One of the strengths of the serious game developers has been to adapt mainstream game interfaces, such as the Wii and Kinnect, to serious applications, like rehabilitation, as cheaper alternatives to expensive specialist equipment.

4.3.3 Middleware

Serious games are being developed on low budgets, and by relative novices. This requires a set of tools that can be used to implement the design of a game, and if relevant, distribute it. While graphics, sound and video can be created with generic tools, the creation of games requires a game engine, and authoring tools to create the game.

There are four main sources of tools for the creation of digital games that can be used by individuals and intermediaries, and novice developers:

1. Commercial and open source tools for producing multimedia products, widely used to create 2D games (e.g. Multimedia Fusion, Stencyl, Gamemaker, often specifically designed for ease of use).
2. Specific 3D commercial game development tools for 2D or 3D games such as Unity3D, the Epic Games Unreal Development Kit (UDK), Torque;
3. Programming development kits that focus on audio-visual content; Special purpose tools for creating education games and simulations such as Thinking Worlds by Caspian;
4. Specially made game and interactive media tools for children's education and training purposes, such as Scratch for PC (MIT), Kodu for Pc and Xbox (Microsoft) or some games that include game making within them e.g. Gamestar Mechanic.

Of concern for the development of serious games and prosocal Games in particular is the availability, source, support and future of those tools. More tools would strengthen both professional and intermediary game-production in particular sectors, reducing costs and training needs. These tools need not be only about manipulating media and game elements, but provide support on pedagogy, built in evaluation etc. For game-making approaches some of the tools, such as Scratch, developed at the Lifelong Kindergarten Group at MIT Media Lab emerge from universities, and are freely available,

with vibrant professional and user communities. Scratch has also been localised into many European languages.

5   Market for games to develop prosocial skills

5.1   Market Description

ProsocialLearn will establish a new market for digital games aimed at increasing social inclusion and academic performance through the acquision of prosocial skills. As the market for digital games to develop prosocial skills is nascent, there is benefit in exploring the broader market for games to develop prosocial skills in order to understand demand and market failures.

The exact definition of prosocial skills targeted through the gaming platform will be specified over the course of the project. For the purpose of this market analysis we have explored resources aimed at developing transferable, social skills. Terms to describe these skills include: team working, emotional intelligence, social awareness,

Prosocial skills are increasingly important for life and work in the 21st century. Employability skills such as team-working and interpersonal skills are increasingly important in a global economy. However rising inequalities in personal and social skills are affecting social mobility and life chances. Reported behavioural and emotional problems amongst school-age children are increasing in some European countries. There is much debate as to whether this is down to earlier diagnosis, increased prevalence or simply applying labels to children facing social issues. However there is a need for education systems to support children to develop prosocial skills and well as more traditional measures of academic success.

This market analysis has focussed on the market for digital and non-digital games that can support the development of prosocial skills that help children succeed in life and work.

5.2   The market for digital games for prosocial skills
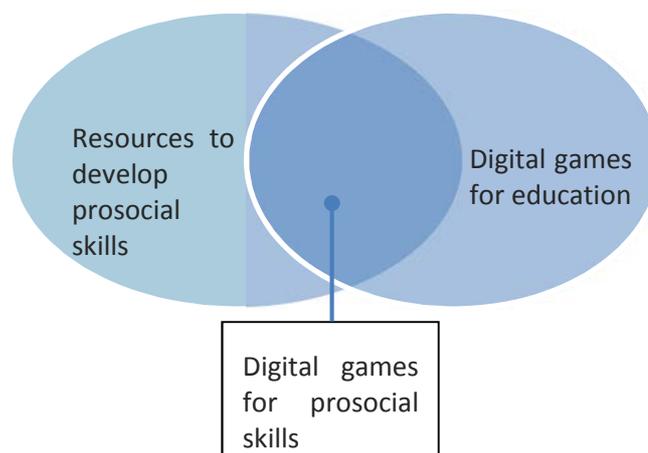

Figure 3 – Market for digital games for prosocial skills

Very few digital games have been developed with the specific aim of improving prosocial skills. Fewer still are based on robust science and have been evaluated. Exploring the two related markets of resources for prosocial skills and games for education will give insights into barriers and market potential.

In some countries there are organisations with a brief to provide evidence and resources to promote social and emotional learning e.g. Collaborative for Academic, Social and Emotional Learning (CASEL) in the US. However the use of games and digital resources is still an emerging area.

Non-digital games for the development of prosocial skills are used more widely and can range from simple tools to integrate into whole-class approaches to stand-alone resources for use with specific groups of children e.g. children with autism or ADHD. Games, psychodrama, role-plays and simulations have all been used in a variety of contexts to develop insight, empathy, prosocial skills and improved behaviour. Non-digital games designed for the purposes of social and emotional learning use strategies such as discussion, role-play and problem solving to engage players in solving social dilemmas whilst practicing social and emotional skills (Hromek, Roffey 2009). Therapeutic board games to teach skills for dealing with issues such as teasing or anger management are one such example and are played with small groups of children for guided practice. The opportunities for developing prosocial skills through game-based learning in the non-digital realm are proven.

Games for education: While the e-learning area of serious games focuses on the production of games for learning, the area of games based learning (GBL) and Digital Game-Based Learning and teaching explores all types of digital game use from the perspective of learners and teachers (Prensky 2008). It is largely focused on school-based education, with some work in other fields of Lifelong Learning (training). Debate continues over the ways that game-based learning works and should be pursued, emphasising or denigrating features such as 'fun' engagement or simulation (Susi et al 2007). Research and practice is focused on understanding use of games in pedagogy and didactics, building sound educational practices, and raising awareness and knowledge about use of digital games among education professionals. This is considerable interest in incorporating this research into digital game-based products in the e-learning industry for professional and educational markets.

The use of digital games in the education sector is one of the oldest applications of games. From the supply side, they can be developed as part of an educational publishing business, and more recently, the e-learning industry. However, educational games, according to the report of the EC Engage project, have always been "low budget, low tech, and poor cousins of the computer game industry. Up until recently, very few commercial companies have provided good quality educational games. Historically, these games have been written by teachers and academics who wish to utilize the technology within their teaching, but usually do not have the skill, not the finance, to create a high quality product".

This is changing with new expertise, tools and changing business models for distribution. Games in education can be replacements for text books and other media, or tools for game making and a more radical approach to teaching and learning. Serious uptake in the formal education sector however, depends on significant innovation in practices of formal schooling, and in the procurement and certification systems for education products. Procurement processes have been raised as a significant barrier to adoption.

5.3   Products and Users:

Products: Although the most logical assumption would be that games for the education market are intended to support learning, interestingly not all products for the education market are educational games. According to recent studies, only 17% of the Serious Games addressing the education market are designed for training purposes. This means that the remaining use of the SGs in the education market can be for transmitting knowledge, educating learners or communicating or to publicise a particular institution.

Research also identifies an 'after school market' for games focusing on cultural aspects. In their website, the Serious Game Association (SGA) states that "games are a more interactive and participatory way to help people of all ages to understand almost anything". According to them, "They are increasingly used in formal education and at home." Thus the 'home, after school, informal learning' can be considered as a submarket of the education market. The main difference relates to 'who is buying', the student or the education institution, and the corresponding business model and value chain.

Research suggests that digital games are used in three main ways in education systems across Europe (European Schoolnet 2009). Each education system draws on these models to a greater or lesser degree and will tend towards one of these.

- Support for pupils in difficulty. Games are used remedially outside normal lesson times (e.g. France)
- Mainstream resource. Games are used in the classroom to increase motivation and learning outcomes for all pupils across a range of subjects (e.g. Netherlands)
- Innovation tool. Games are used specifically to develop advanced skills such as innovation, creativity, self-confidence, co-operation, initiative and enterprise. (e.g. UK)

Each model presents a different approach for the development of prosocial skills. Therefore the ProsocialLearn platform may need to be flexible to the development of resources that fit each model in order to fulfil demand-side needs across Europe.

Target audience: There are a number of key players on the demand side whose needs and characteristics will need to be taken into account when developing the ProsocialLearn platform:

- **Users:** Children at risk of exclusion: The project has identified that children at risk of social exclusion, showing little or no signs of empathy and high levels of aggressive or anti-social behaviour should benefit from digital games tailored to teach prosocial skills. This will be the primary user group targeted. Historically, prosocial learning has been seen as particularly appropriate to those who have been identified as having a significant deficit e.g. through individual counselling or group therapy. However that paradigm is shifting.
- **Their classmates:** Approaches in some countries have been shifting to include a focus on social and emotional well-being at a universal level within education, although there will always be some students who benefit from additional support. Some techniques also rely on group work with the inclusion of a peer with good prosocial skills to come up with positive suggestions. In order to maximise benefit for children at particular risk of exclusion, games may need to draw in a wider group of children.
- **Facilitators:** The role of the facilitator in the delivery of game-based learning is crucial to providing a motivating and safe learning environment, especially with games designed to enhance prosocial skills. The facilitator may be a:
- **Behaviour specialist:** Some children who are already at risk of exclusion as a result of behavioural issues will already work with specialist staff e.g. educational psychologists, specialist support staff. These may work with children in a school setting or within specialized institutes. Specialists would be more likely to have a sound understanding of pedagogy and skills needed for effective development of prosocial skills.
- **Classroom teachers:** Research shows that when activities to develop prosocial skills are integrated into the regular curriculum they are more likely to have lasting effects (Elias & Weissberg 2000). So non-specialist teachers will play an important role. In addition, many

schools struggle to access resources for specialist help for children at risk of social exclusion. Teachers will therefore be responsible for designing and delivering many of the interventions to address social, emotional and behavioural issues.

- **Commissioners:** Who will pay for games to develop prosocial skills?
- **School leaders:** The majority of education ICT budgets are devolved to schools so many ICT resources are purchased by schools individually. Convincing individual ICT commissioners within schools of the cost-effectiveness of purchasing a licence for ProsocialLearn with be key to developing the market.
- **Regional or national school networks:** It could be efficient to target school networks and collaborations that share resources. For example, in the UK chains of Academies and federations may develop their own pedagogy and school improvement approaches. Sponsors of larger chains may commission resources on behalf of schools. In Italy, the DANT project set up a large-scale community of practice amongst teachers interested in educational games and made games available to this group for testing, feedback and use.
- **Education Authorities:** Whilst a lot of educational and ICT resources are devolved to schools there will be differences across countries as to how specialist support is commissioned. There are examples of Education Authorities purchasing and distributing licences and games to schools (e.g. Zoo Tycoon in Austria) or providing backing to game-based learning projects (e.g. the Consolarium, Scotland).
- **Parents:** For most pupils the amount of time spent on ICT at home greatly exceeds the time spent on ICT at school: they have greater autonomy to explore ICT and can use it for longer periods. It is clear that much learning does take place in the home environment through the use of games and ICT and some parents may be prepared to pay for apps and games that support development of prosocial skills. There is a risk, however, that target users for this project do not have the infrastructure or learning environment in place at home. Access to ICT in the community lacks flexibility and can be expensive so pupils without access at home are disadvantaged.

5.4   Technology and Platforms

An EU survey of ICT use in schools (European Commission, 2013) shows that use of technology in schools is increasing however there is still high variation in the extent to which students are learning in a highly 'digitally equipped school' – one with relatively high equipment levels, fast broadband (10mbps or more) and high connectedness (website, email, virtual learning environment and local area network). Across the EU half of pupils at best attend such a school (37% of grade 4 pupils and 55% of grade 11 pupils). There are also great differences between countries.

Even where equipment is available there is wide variation in the degree of use and how well the equipment is being used. More than 50% of pupils at all grades never or almost never use digital resources or tools.

The boundaries between school and home IT are blurring. 28-46% of pupils say that they use their own mobile phone for learning purposes in schools at least once per week. Increasingly, and whether sanctioned or not, pupils seem to be bringing their own technology into school and using it for learning.

6 Barriers and drivers for ProsocialLearn

Trends across these different markets present a number of barriers and drivers across several topics to be considered in development of the business case

6.1 Technological

- **For social games, the console and handheld market could complement games used in schools (driver).** This is because it still represents the mainstream of videogame play and an important source of innovation in the consumer market. Consoles are sold heavily subsidised, which makes them accessible to most families and institutions in ways that the PC has not been, and they are products that are clearly associated with play, sociality and the domestic sphere, in contrast to the PC. On the other hand, the proprietary systems, the structure of the game only market has increased the cost of access for developers, the value chain and limited channels for reaching the market.

- **Developers in the traditional entertainment market are increasingly developing more advanced games for both PC and online formats (driver).** Developments within this sector and expertise may well be a key technology within schools, as the avenue of familiarity with gaming and game technology becomes more familiar, acceptable and commonplace within both the school and home environment.

- **Scope for a specialist platform to cut production costs.** Since collaboration between game designers and professionals in application domains is in its early days, the tools and production process is far from streamlined. Special purpose tools that facilitate game creation for the prosocial skills sector, embedding both game design expertise, management of media assets, evaluation tools, pedagogical elements can improve the speed and quality of production, and reduce costs.

- **Schools have Insufficient computers available (barrier):** some schools only have one or two classrooms or labs fully equipped with computers and so feel they can't make use of games in mainstream lessons. More recent research reports that laptops, tablets and netbooks are becoming pervasive but only in some countries (European Commission 2013). On average across the EU only between 25 and 35% of students at grades 4 and 8 are in highly equipped schools (i.e. high equipment level, fast broadband) and this varies widely by country. This remains a relevant barrier.

6.2 Supply-side capability

- **Poor quality products (driver).** A widespread criticism of many serious games, and one that was echoed in the IPTS expert workshop in 2012, is that many 'serious games' are of very poor quality, due to lack of expertise in game development and lack of resources. Games are added to existing products and platforms, such as e-learning materials but are of poor quality and uninspiring to those who they are meant to engage. This does not help the image of the approach, among the end users or videogames professionals.

- **Attracting game development expertise to non-leisure applications (driver).** The emerging market for supply of expertise and products for serious gaming is fragmented and business models and interest uncertain. Key to successful games is the emergence of a set of expertise specifically related to game design: how to create and harness elements of game play, and bring together different media elements to produce compelling products. The 2012 IPTS Expert workshop identified a key problem of attracting professional game designers and

students to work in serious games, since ambitions and motivation for these professionals and would-be professionals is in making a career in the dynamic and exciting entertainment game sector. Efforts to get these people to consider serious gaming as a legitimate field of work are only just beginning. Nonetheless it is starting, and game developing companies, particularly smaller ones, are starting to explore the potential of entering the serious game market.

- **For social games, middleware technologies and platforms are important resources (driver).** They allow developers without in house technologies to produce games that match leisure-game quality. Similar middleware technologies on the ProsocialLearn platform could enable developers to produce high-quality games to develop prosocal skills.

- **Market analysis shows that skills exist in the entertainment sector to contribute to development of prosocial games (driver).** The new digital distribution platform for these games could reduce risk for developers and make it a more attractive market.

- **Quality is improving and there is an opportunity for ProsocialLearn to lead the way (driver).** The players in the emerging digital serious games sector are currently addressing some major industrial challenges. The value chain is changing, especially in the upstream production layer, due to the introduction of high-quality production tools. Quality of production is also is increasing thanks to the integration of specific domain-related skills in their teams and specific expertise from the videogames industry, and developing project management experience.

- **Opportunity to capitalise on downstream restructuring (driver**). There are signs that issues related to hosting platforms, distribution, marketing and deployment of digital serious games are being tackled with the aim to structuring and 'pooling', at best in a standardized framework, downstream in the value chain. Just like its parent the videogames industry (though the parent may deny the legitimacy of descent), digital serious games is a cross-platform industry.

- **Opportunity to bring scientific rigour to gaming metrics (driver).** While currently products are in the main deployed on personal computers, it will certainly expand onto new generation consoles, and mobile and online platforms. Metrics used to optimize online gaming and maximize revenue can be used instead to evaluate use and behaviour and maximize impact. However this needs to be done in a much more scientific manner with goals of learning, behaviour change etc that go well beyond customer loyalty or repeat spending, and with considerable care over interpretation.

6.3   Demand

- **Demand-side still developing (barrier).** While intermediary organisations like IT and telecoms companies or media commissioners are spending on digital games as part of marketing and communication strategies, other end user organisations are only just start to be aware and have the interest to commission services. Market building is still required in some sectors, including the market for digital games to develop prosocial skills.

- **Business models are still evolving and different pricing models will need to be explored (driver).** Many questions over possible business models and pricing are still open. Alvarez at al (2011) identify a number of issues that the ProsocialLearn business plan will need to explore:

o The teaching and learning sector may rely on the non-exclusive licensing model when acquiring a serious game and offering it to the public, without using a service to train future trainers. Each target category corresponds to several pricing and business models. They will depend on the nature of the target, i.e. whether it is a business or an association, an institution, a citizen, an Internet user, a consumer, a professional, etc.

o On the whole, the pricing model used for a serious game aimed at the general public, whether consumers or citizens, is one of free or freemium. The business model will be based on sponsoring, advertising, subsidies and self-financing and user fees.

o In most cases, the pricing model used for a serious game aimed at a public or private establishment will be based on a fee-based service that includes the acquisition of a licence and/or a service for training users in the game and/or a game support and update service and/or a service for keeping track of and processing players' results and scores. The business model employed for the production of the serious game is a flat-fee contract and/or revenue sharing if several partners are involved.

o The more technologically sophisticated the application, the more difficult it is to play, the more complex it is to configure and the more it requires real-time monitoring, the more the licensing model appears to apply, combined with training and a support service for use of the serious game.

- **Education procurement processes may not fit digital game products (barrier).** To sell into markets where procurement processes are formalised and centralised, these processes need to be opened up to digital games and digital games suppliers. Processes of quality control and standardisation need put in place, and pathways for procurement of digital game products and services made explicit.

6.4 Societal

- **Online gaming is bringing an online social dimension to digital games (driver).** This is of clear relevance to prosocial games in application seeking to increase participation and skills in interacting with peers. The uptake of these types of games creates both the expectations from players, models and technologies for development, and new business models where users play for free with paid for additions, reducing initial barriers to use considerably. Thus the 'social' multiplayer nature of games opens up avenues for social interaction and participation for certain excluded groups not provided by stand-alone games.

- **Smartphone ownership and mobile gaming are on the increase amongst younger people (driver).** This brings an opportunity to consider how mobile platforms could be exploited to deliver highly personalized and accessible games for prosocial learning where content could be delivered across a number of different platforms from PC desktop to tablet and mobile devices. Mobile devices enable games to be highly personalised and played in relative privacy, increasing their potential.

6.5 Educational

- **A key barrier is the lack of awareness and recognition of the importance of prosocial skills to learning and development (barrier).** This is still not fully understood nor appreciated by parents, teachers or children themselves. Without appropriate recognition of this issue, time and resources to make use of opportunities presented by games will not be prioritised. The

congruence of the values and ethos of a school are critical to embedding prosocial learning across the whole school community (Roffey 2008). It is therefore important that development of these skills is prioritised at whole school level.

- **Even when the importance of prosocial skills is recognised, they are challenging to tackle (barrier).** Competencies underlying prosocial skills are dynamic, overlapping and always in interaction with specific contexts (Trilivia & Poulou 2006). Prosocial learning also focuses not only on the acquisition of knowledge and skills as in other subject areas but also in changing or developing values, beliefs, attitudes and everyday behaviours. This makes the teaching of such skills complex and highlights the importance of pedagogy and teacher skills (Hromek, Roffey 2009). A basic underlying skill and pedagogy must be in place to make the most of the potential that games have to offer in the realm of developing prosocial skills.

- **The timetable of the school makes it hard to integrate use of digital resources (barrier).** This is partly because of heavy workloads and limited time to prepare the use of games. Secondly there is not enough time available within the timetable as a lot of topics have to be covered. Thirdly it is hard to fit games into the timetable because the computer lab is not available or because games last longer than a typical lesson.

- **Many teachers report that it is difficult to integrate games into the curriculum (barrier).** This can either be because of the way that the curriculum or course is structured or because the games do not match the course objectives well. Another barrier that may add to this issue is the fact that whilst the importance of social and emotional skills is increasingly recognised it is not explicitly factored into the curriculum in all European countries. Schools will have a lot of autonomy as to how they develop these skills in their students. Whilst this provides a lot of scope for innovation it will also make it more challenging to develop games that easily and obviously map to curriculum requirements. It also means that not all schools and teachers are yet prioritising the development of these skills over knowledge acquisition.

- **Teachers have insufficient training and support (barrier).** The main issue raised was a lack of understanding as to how games could be used and the lack of opportunities to exchange experiences with other teachers. Teachers want ideas and strategies for integrating the use of games into the classroom as well as the resource itself. Most teachers only use ICT to prepare their teaching, only a few use it to work with students in lessons (European Commission 2013)

7   Competitive advantage and initial SWOT Analysis

To evaluate the use and/or integration of digital games into the learning process, consideration must be given to the strengths and weakness of use as well as the opportunities and threats that exist surrounding their use. The following SWOT analysis is not meant to be wholly comprehensive – but is targeted as a starting point for further discussion and development.

Strengths

- Game-based learning can support collaboration, problem-solving and communication across a wide range of both learning communities & student requirements.

- Allows for targeted learning, knowledge construction and creativity development.

- Ability to apply both focussed and concentrated instruction for participating students.

- Tangential learning is possible through well designed games.

- Students are often engaged when learning through games. Game-based learning is specifically designed to have an appropriate balance between success and frustration in order to keep players motivated, persevere and improve.

- Digital games meet the needs of "digital natives", ie learners who have grown up with modern technology.

- Game-based learning can develop a highly engaged environment where students can refine, evaluate and enhance their skills by playing games that will continually challenge them.

- Integrating game-based learning into the curriculum allows for increasing computer literacy skills, problem solving skills and real world applications.

- Game-based learning can present and foster an immediate application of theory.

- Games can provide instant feedback and reward the participating student's master activities or levels, whilst allowing students ownership and control of their own progress.

- Game-based learning can inspire an alternative approach to teaching and promote an increase in learning.

- Today's generation of learners "think and process information fundamentally differently to their predecessors. Game-based learning can give teachers the opportunity to speak and communicate efficiently and in their language.

- Games to develop prosocial skills can build on expectations and experiences of online social gaming.

Weaknesses:
- Potential lack of technical support as school systems may vary dramatically.

- Rigidity of educational systems from country to country.

- Reliance on teachers to implement, install and maintain software.

- If instructors use game-based learning as a default activity they may overlook opportunities to apply learning in real life.

- Games may become a source of fun instead of being the learning tool.

- Students failing to grasp the benefits of the game.

- Most current game-based learning involves the student sitting at a computer or console rather than being active.

- There may be a significant front-end time commitment involved in familiarizing students with programs and technology involved with a particular game-based learning system.

- Potential difficulty of gathering any outcomes of game play assessments & measurability for metrics and effectiveness

- Prosocial skills are challenging to develop and underlying skills and pedagogy must be in place to make the most of the potential games have to offer

Opportunities:

- Reduction on the cost of didactical teaching materials.

- Formulation surrounding the use of digital-based games as a tool to harness student engagement.

- Many commercial off-the-shelf game-based learning systems exist that are effective in teaching the content, skills, and problem-solving needed to win the game. These methods can be readily accessed by educators and evaluated for their appropriateness in the classroom.

- Proffers opportunities to utilize experiences within the real world.

- Game-based learning has instructional potential but could improve further if developed or codified specifically in an educational context and for a variety of audiences.

- Personalization and targeting of learning is possible through the use of games.

- Game-based learning can changes or alter a student's perceptions about learning and gathering knowledge.

- Instructors have the opportunity to develop more flexible assessment tools to reflect the learning that takes place through a game-based learning system.

- Game based learning can be customized to account for individuals with disabilities or specific social needs.

- Allows the targeting of specific educational areas and tailoring of lessons within specific areas in relation to the needs of the classroom.

- Game-based learning can garner and collate specific metrics surrounding lessons, student progression and interactions.

- Provides opportunities in educational research.

- Evolution of serious games into mobile, PC and online presents opportunities for cross-platform products to complement learning resources in schools.

- Development of middleware technologies can allow developers without in-house expertise to develop scientifically robust games of high quality that match experiences in the leisure market at a feasible cost

- Development of distribution platform and support could reduce risk for developers and stimulate market

Threats:

- Reputation for poor quality products in the serious games industry

- Schools do not prioritise the development of prosocial skills in the curriculum

- A fundamental shift in the way education systems are designed may have to occur if digital game-based learning is to be fully embraced.

- If there is initial lack of demand from schools then this could lead to fewer developers using the platform

- Incompatibility between available hardware and software packages.

- Potential lack of technology in schools and technical support and problem solving surrounding hardware and software - such as continuous updates.

- The costs of developing serious games for the educational world can be prohibitive to game-developers. The market for game-based learning that are designed to be educational within a curricular construct does not yet fully exist to make development financially appealing.

- Schools and parent groups may have ethical issues regarding potential partnerships between educational groups, commercial game companies and corporate sponsors that may exist to develop game-based learning programs.

- Risk of not accomplishing the lesson's objectives.

- Challenges of integrating games into the curriculum

- Social and ethical issues surrounding the content of some games that may be deemed objectionable.

- Parental concerns over school time being filled with the perception of game play or preconceptions and lack of understanding by "digital immigrants" surrounding the use game-based learning.

- Students losing interest in game-based learning.

- Games may ultimately become too competitive, thereby undermining the educational benefits of the experience.

- Failure to present game-based learning that has a wide appeal across all student demographics.

- Many games are frequently updated, making it difficult for educational researchers to evaluate the impact of new features, changes to gameplay, etc.

- As technology advances, it is difficult and costly for schools, students and teachers to keep up with new information and games. There is often insufficient training and support for use of games in education.

8 Conclusions

The purpose of this deliverable is to analyses a number of relevant markets in order to draw insights for the development of the ProsocialLearn platform.

This document has been prepared as part of the research line for Game market Analysis, Exploitation and Business Modelling. The document is based on on-going research surrounding the market potential of digital games within the framework and development of prosocal skills.

The overall objective of the document is to analyse the market structure and competition and consider the potential positioning of the ProsocialLearn platform.

9   Glossary

The videogames market can be analysed a number of ways. The following categories and distinctions and concepts are current in the industry, and help understanding of analysis. This list is drawn from definitions and discussions in the literature, especially (De Prato et al 2010).

ARIMA. In statistics and econometrics, and in particular in time series analysis, an autoregressive integrated moving average (ARIMA) model is fitted either to better understand the data or to predict future points in the series (forecasting).

Business Model. The concept of the business model in the literature on information systems and business refers to ways of creating value for customers, and to the way in which a business turns market opportunities into profit through sets of actors, activities and collaboration

Endpoint. An endpoint device is an Internet-capable computer hardware device on a TCP/IP network. The term can refer to desktop computers, laptops, smart phones, tablets, thin clients, printers or other specialized hardware such pints of sales terminals and smart meters.

Mainstreaming is the planned process of transferring the successful results of programmes and initiatives to appropriate decision-makers (convincing them to take into account the project results) in regulated local, regional, national or European systems.

Multiplication is the planned process of convincing individual end-users to adopt and/or apply the results of programmes and initiatives.

Original Equipment Manufacturer (OEM). OEM is used to refer to the company that acquires a product or component and reuses or incorporates it into a new product with its own brand name.

Software as a Service (SaaS) is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet.

Value-added reseller (VAR) is a company that takes an existing product, adds its own "value" usually in the form of a specific application for the product and resells it as a new product or "package."

Hardware Platform: The different consoles and handhelds are distinguished, and these are distinguished from the PC, Mac, and now mobile phones, smart phones, tablets and next generation connected televisions.

OS Platform: For consoles and traditional handhelds, the OS is inseparable from the hardware, but PC/Mac is differentiated, and now mobile OSs such as Android and Apple iOS.

Browser Vs. Standalone: In PC and mobile gaming, standalone games are installed as separate applications on the computer or phone, while browser games run directly in the Web browser using standard technologies designed for enabling interactive multimedia, such as Flash, Java. Browser games are usually casual games, and often made available with a free (advertisement funded) or ''freemium' business model (see below).

Online-offline Browser Games: Offline games are played without the need for an internet connection, installed as an application; online games can include both those played with an application or client on the player's device, or through a generic browser, connected to a server or other clients over a network, but will generally refer to the former, and often to Massively Multiplayer Online Games (See below).

Social Games: Does not refer to games that are played socially, as many are, but to digital games that are played on and using the capabilities of social network services such as Facebook. Games can be individual use with sharing of scores, badges etc, or truly multi-player with in-game interaction.

Mobile Games: A term used to refer to games produced for and played on mobile phones and similar platforms, The products and industry are differentiated by having to respond to the particular structure of the mobile telecommunications industry the capabilities of telephones, and the rather closed game distribution systems available in this industry. Occasionally called 'wireless' gaming. Tablet-based gaming fall uncomfortably between PC and mobile gaming in this definition.

Multi-player Games; Social Network Based; Multiplayer; Massively Multiplayer: Many digital games, like non-digital games, are designed to be played by several people at the same time. This can be turn taking or simultaneous play. Players can be co-located, using the same or different devices, or play over a network. Network play will generally be facilitated by a game server. In-game interaction will generally be complemented by out-of game interaction, though text chat, voice, video, social media or other communications channel. Massively Multiplayer Online Games (MMOG), with 10s or 100s of thousands of players playing individually or in teams are a major growth and innovation sector of the market, and basics for complex new social and cultural forms of interactio.

Augmented Reality, Alternate Reality (ARG), And Gamification: Although rather different concepts, these are all areas of gaming that extend into 'real life', where software and the internet game facilitates and supports games and play physical space and 'real life' relationships.

'Gamers', Non-gamers And Casual Gamers: 'Gamers' usually refers to those people who make up the core of the digital game market: they invest time and money in playing games, it is a hobby and even a lifestyle and identity, involving consumer and social activities around games (websites, magazines, competitions, parties etc), and without question gamers are predominantly young men. Non-gamers can either be those who do not play digital games, but these are increasingly rare. Instead it can refer to casual gamers, who do not identify themselves as gamers, but will play (with) digital interactive entertainment products. This group of people who now have access to the means to play digital games and game-like products is now recognised as the fastest growing market segment, and the growth of casual games is changing the definition of digital games and gamers.

AAA, Casual and Indie Games: AAA games are the multi-million dollar budget games produced by AAA Studios that can take 2-3 years to develop, and sell in millions of 10s of millions of copies, or count 100s of thousands of online users. They tend to make maximum use of the possibilities of hardware technology of consoles and the PC. AAA games are made in all genres, and generally targeted at 'Gamers'. Casual games include games for the mass market, and are generally simple to learn, cheap and can be created for platforms such as the web browser and mobile phone. They work in many genres, but include digital version of puzzles, board games, and card games. However many high value games for consoles including music, dance, fitness games are also termed casual 'Indie games' primarily refers to games produced by independent studios, often with a focus on innovation, creativity and exploration of genres and gameplay.

Serious, Meaningful or Applied Games: The use of game techniques, genres and technology to design tools and products used specifically for non-leisure ends, such as defence or education. Difficult to produce since it requires integration of expertise in 'serious' application domain with expertise in producing 'good' games. Though hotly debated, there is widespread use of the term serious games and identification of a serious game market and industry.

Game Genres: Games are categorized according to form, gameplay and interactivity etc. for analysis and marketing. Most popular genres include Strategy, Simulation, such as Sports, Driving, Construction, Life and Social simulation, Action including fighting and shooter, Adventure, Role-playing, Music and Dance etc. There are other crosscutting genres, such as party games, multiplayer games. Educational and 'Serious' games can work in many of these genres as well. Some purists 19 would suggest many of these are not true game genres, but variations on puzzles, competitions etc.

Business model: pay, free, freemium and 'monetisation': Digital games have traditionally been sold as paid products, and more recently by subscription on online games. Free games characterize much of the casual, browser-based market, often funded by advertising. Freemium is a model common in browser, social and mobile markets, where game-play is initially free, but continued play usual requires purchases, such as in-game credits, virtual goods, extra levels etc. Monetisation is a general term used in free and freemium business for ways to make money from player. In-game adverts and coupons giving game developers a percentage of 'real world' sales is one mechanism.

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Appendix 1 - Template for analysing prosocial competitors and prosocial scenarios.

This appendix considers several steps that must be conducted to define the blueprint of analysing any competitors within the market. This can be achieved using the associated excel sheets developed, the tables of which figure below.

Competitors Analysis

The following table can be utilized to summarise the main characteristics of the competitors by taking into account the five main pillars:

1. Innovation capacity of SME's from the traditional gaming industry to produce engaging and exciting digital games for children.
   - Educational sector oriented
   - Distribution channels established towards the European sector
   - Size of developer community
   - Commercially viable
2. A prosocial game development and distribution platform
   - API
   - Mechanisms for data collection
   - High level of protection surrounding personal information/data
   - Methodology for the gamification of prosocial learning
   - QoE evaluation
   - QoS evaluation
   - Multi-device (PC, Tablet, Mobile)
3. Automatic measurement of prosociality and seessment of learning outcomes
   - Outcomes linked to prosocial learning objectives
   - Control of player behaviour (emotion, trust, engagement, empathy)
   - Vision-based facial and motion analysis
   - Teacher dashboard
4. Adaption to player profile including skills, personality and socio-cultural context
   - Game elements adaptable to player profiles and cognitive/emotional state
   - Adaption of games based on player profiles and learning objectives
5. Demonstration for improvement of inclusion and academic achievement
   - Pedagogical studies conduced

Name	Comeptitor 1	Competitor 2	Competitor 3	Competitor n	ProsocialLearn

Name	SMEs initiative	Technology	Assessment	Adaptation	Demonstration

Competitor 1	
Competitor 2	
Competitor 3	
Competitor n	
ProsocialLearn	