



Working in Australia's Digital Games Industry

CONSOLIDATION REPORT

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Australian Research Council Centre of Excellence for Creative Industries and Innovation (CCI) and
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1. Report Summary

Purpose, rationale and approach (Chapter 2)

1. This consolidation study was initiated in response to concerns that Australia's games industry would not reach its full potential in the near future due to a) a lack of local, highly skilled staff to work in a high growth industry; and b) a lack of appropriately trained graduates equipped with the necessary knowledge and skills to enter the industry.
2. The purpose of the study is to a) identify and analyse current and future skills needs and gaps in Australia's digital games industry in order to b) determine which occupations and skills sets require employment and training focus for the labour market.
3. The study consists of two stages – *Stage 1: A consolidation study* to draw together existing literature, studies, policies, programs, statistical data, and other sources relevant to the skilling of digital games workers (this report); and *Stage 2: A future skills strategy for Australia's digital games industry* that involves a scenario planning exercise (next report). The strategy will include short-term and long-term solutions to address workforce development priorities and issues for three to four different scenarios of the state of the games industry in 2015.

Characteristics and performance of Australia's digital games industry (Chapter 3)

4. There were 45 games development businesses in Australia as at June 2007. These businesses mostly operated in Victoria, New South Wales and Queensland, and employed 1,431 workers. In 2006/2007, these businesses generated income of \$136.9 million (Australian Bureau of Statistics 2008).
5. During the 30-year history of Australia's digital games industry, some Australian developers have achieved international critical and/or commercial success, and gained experience in developing and marketing products for the largest game publishers in the world (Australian Government Cultural Portal 2007).
6. Competitive advantages for Australia's digital games industry include its low production costs, cultural proximity to major Western games markets, native English speakers, online gaming expertise, links being forged with Korea and China, good levels of State government assistance (mainly in Victoria and Queensland), games clusters co-located with other media, an increasing pool of local talent, and the existence of a few super-developers creating "pockets of excellence" (UK Trade & Investment 2007).
7. Challenges contributing to Australia's digital games industry's reputation as a "niche player" include the small size of the industry, staffing difficulties, low levels of access to non-government funding, low levels of IP generation, timeframe differences, geographical remoteness from the United Kingdom and Europe, reliance on overseas companies, and a contracting independent sector (UK Trade & Investment 2007). These issues are contributing to the view that Australia's games industry is struggling to become sustainable.
8. Despite higher revenue and consumer spending in the Australian video games industry as a whole, the Global Financial Crisis (GFC) has led to a downturn in the digital games industry in recent years. Major developers in Australia that have experienced job losses and/or business closures include Krome Studios, Transmission Games and Pandemic. Views expressed by some industry commentators as well as a significant number of employees who responded to this study's Worker Survey suggest that the industry will remain flat for some time. Yet some industry luminaries have a view that there is now a new, stronger industry with a focus on small teams and new platforms, whose investment potential is staggeringly bigger than that of its predecessor.

International games environment (Chapter 4)

9. The games industry is experiencing a) a greater concentration and conglomeration of publishing and distribution capabilities; b) increased licensing of intellectual property from real world and other media resources; c) a decrease in the production of independent games; and d) an increasing trend towards sequels, multi-platform licenses, and derivative game ideas (Kerr & Cawley 2009).
10. There are differences in the American, the European, and the Asian markets in terms of preferred platforms and content, infrastructure, regulations, and payment systems (Preston, Kerr & Cawley 2009).
11. Global Software Development (GSD) is on the rise due to a) reduced development costs due to salary savings; b) reduced development duration; c) closer proximity to markets and customers; and d) new opportunities e.g. potential access to a larger and better-skilled developer pool (Conchuir, Agerfalk, Olsson & Fitzgerald 2009).

12. The diffusion of broadband Internet access; increasing investment in R&D leading to advances in game features, infrastructure, hardware and software; and changing player demographics are leading to new business models (OECD 2005). Although the traditional models for console games and stand-alone PC games remain dominant, subscriptions and microtransactions are rapidly increasing in popularity.
13. The United States accounts for the largest share of games studios in the world (Gamedevmap.com 2010). Only 3% of all studios are located in Australia. The regions of North America and Europe, Middle East and Africa are losing market share of the global video games market whereas the Asia Pacific region is gaining market share. In the Asia Pacific region, Japan is losing market share whereas China is significantly increasing market share and is likely to surpass Japan's market share by 2014. Australia's market share is declining (PricewaterhouseCoopers 2010).
14. For most positions, salaries for games workers in Australia are well below salaries for games workers in Canada, France, United Kingdom, and United States (UK Trade & Investment 2007).
15. Australia's games industry recorded the second lowest competitiveness rating out of seven countries, and the United States recorded the highest competitiveness rating, followed by Canada and the United Kingdom (UK Trade & Investment 2007). Strengths of countries with high competitiveness ratings include a) generation of world-class AAA IP; b) being home to the world's major publishing companies and leading developers; c) a workforce of world-class creative and technical talent; d) government funding and support; e) large retail markets; f) cross-fertilisation from other world-class media industries; g) ongoing technology innovation; and h) a smooth path between universities and commerce that allows commercialisation of new technology.
16. The global video games market is expected to grow from US\$52.5 billion in 2009 to US\$86.8 billion in 2014, driven by a) new games for the current generation of consoles; b) expansion of the online market; c) introduction of next generation of consoles; d) increasing popularity of massive multiplayer online games (MMOGs) with subscription fees and microtransactions; e) growth of casual games, helping to expand the demographic base and stimulate spending; f) growth of smartphones with improved graphic capabilities, stimulating demand for wireless games; g) new application stores making the purchasing of games more user-friendly; and h) growth of 3G networks with their faster speeds, enabling wireless games to approach the quality of console games (PricewaterhouseCoopers 2010).
17. Issues related to connectivity, legal frameworks, micro-payment systems, availability of skilled female employees, management and organisation, financing issues, lack of public support, and limited knowledge transfer with other creative sub-sectors are barriers to industry growth (OECD 2005; NESTA 2008).
18. When surveyed in 2009, games businesses around the world had "unbridled optimism" about 2010 due to the predicted strong increase in revenues from digital distribution and MMOs, new business models, new audiences, and new lines of business. However, games developers were less optimistic than publishers, retailers, and outsourcing and service providers about 2010 and less confident about their ability to face the evolution of the industry (Games Connection Research 2009).

Skilling of games workers (Chapter 5)

19. The review of key reports relevant to Australia's games industry identified the following ongoing skills issues: Skills shortages and gaps; insufficient/ineffective linkages between industry and providers; rapid pace of change means workers need access to ongoing education and training; mismatch of graduate skills and industry needs; a lack of local experience and skills resulting in expensive and time-consuming overseas recruitment; critical importance of certain non-technical skills; teachers with insufficient industry experience; and shortages of structured on-the-job training opportunities.
20. The Australian Government provides some support to the games industry through organisations like Screen Australia and the new Creative Industries Innovation Centre. The Victorian and Queensland Governments are the main State Governments that directly support games companies operating in these States. Overall, the level of Government investment in the industry is not sufficient to stimulate growth or help address the above skills issues.
21. Many education and training providers in Australia offer games and games-related courses. However, games companies often prefer graduates from particular courses and providers, such as the *Advanced Diploma of Professional Game Development* offered by the Academy of Interactive Entertainment.
22. Innovation & Business Skills Australia's (IBSA) 2009 review of qualifications, skills and units of competencies for digital games development identified demand for skills sets in the areas of foundation or essential skills in new media and web content creation; programming for games and 3D Interactive Media; and advanced programming for virtual games and 3D environments. IBSA (2011) recently identified Games Developer, 3D Animator and Visual Effects as occupations and jobs roles currently in demand.

23. The analysis of skills standards, competencies and frameworks in different countries found students are expected to develop technical/specialist knowledge, and to an increasing extent, business, management, and generic/transferable skills and attributes, such as time management, communication, flexibility and self-motivation. The curriculum framework based on a cross-disciplinary approach to games-related education developed by the International Games Developers Association (IGDA) is comprehensive, consisting of nine core topics that IGDA believes address the unique practical and theoretical concerns of games.
24. Polls undertaken as part of this study found 84% of participants indicated that games courses in Australia were 'highly ineffective'; and when asked about the factors that were 'important/very important' to employers' recruitment decisions, 91% indicated having the right job skills and knowledge, 78% indicated having creative talent; and 45% indicated having the right qualifications.
25. UK's Digital Native Academy (2008) summed up the issues common to games education and training: Oversupply of games courses leading to an oversupply of graduates who are not industry ready; the industry lacks a strong culture of training and development; concerns about the quality of content, delivery and outcomes; games companies involved in the serious games industry recruiting from a broader and a wider range of degrees rather than games courses; and ad hoc, underdeveloped or not maintained links between employers and providers.
26. Some of the ways suggested to improve the skilling of games workers include courses with student showcases, salons and collaborative classes (Swain 2009); a meta-organisation that is a single face for game-related programs and researchers (Swain 2009); providers considering the main features of courses recognised as being excellent/best-practice, whether accredited or non-accredited (Digital Native Academy 2008); identifying the range of skill needs for serious games development for possible translation into education provision (Digital Native Academy 2008); a Games Education Fund (Fear 2008); more incentives for the design of curricula relevant to industry, such as a 'kitemark' scheme linked to funding for games courses (NESTA 2008); a one-stop online repository and community site for teachers for video games and visual effects educational resources (NESTA & Skillset 2011); and raising awareness of the video games and visual effects industries in the eyes of science, technology, engineering and mathematics (STEM) and arts graduates (NESTA & Skillset 2001).
27. Education and training providers may be graduating too many people and offering too many games and games-related courses for Australia's small games industry.
28. Greater government and industry investment in R&D programmes leading to company spins-offs and start-ups; and companies working closely with selected institutions to produce graduates that meet their needs are key reasons why Canada and the United States have good university-industry linkages (UK Trade & Investment 2007).
29. In 2007, demand for specialist workers with online games development experience was dominant in Australia, Singapore and South Korea, whereas demand for workers with experience "across the board" was dominant in Canada, France, United Kingdom, and the United States (UK Trade & Investment 2007).

Potential areas for further investigation (Chapter 6)

30. Exploring how Australia's games industry can prepare well for the growing demand for online and wireless games, serious games and advergames.
31. Turning brain drain into brain gain and brain circulation to develop particular areas of expertise in Australia (such as online games) through joint Government and industry incentives designed to attract and retain overseas talent, and encourage Australian talent working overseas to return home.
32. Assessing industry demand for graduates from games and games-related courses as well as course preferences by industry to ensure the education and training system is producing the right number of graduates in the right fields.
33. Developing a national on-the-job training program for students that is industry-endorsed, government-supported, and flexible enough to meet the needs of an individual games company/studio.
34. Ensuring games courses equip students to work in other industries; and provide students in other disciplines (e.g. education, law and business) with access to relevant opportunities in the games industry, such as on-the-job training programs with serious games developers.
35. Examining the feasibility of a one-stop shop that a) provides information to prospective and current students, companies, and other stakeholders about games courses and research; b) brokers and promotes on-the-job training opportunities; c) provides advice on government support for the games industry; d) develops relationships between companies, providers and government agencies; e) shares information about industry needs and trends with relevant bodies in Australia; and/or f) manages a games R&D programme.
36. Ensuring frameworks for best-practice games studio culture and management include indicators relating to the skills sets necessary to produce innovative and original IP and provide advice on how skills sets should be organised.

2. Introduction

This chapter of the report commences with a rationale for undertaking this study. It then outlines the purpose of the study, approach taken to achieve this purpose, and definitions of key concepts used in this report. The next chapter (Chapter 3) consolidates sources related to the evolution, characteristics and performance of Australia's digital games industry.

2.1 Study rationale

This study started in 2008 when Australia's digital games industry had not experienced the full impact of the Global Financial Crisis (GFC). At the time of writing the original proposal for this study, the Australian Government had praised the games industry in its 2020 Summit document, *Creative Australia*: "Australians excel globally at computer game design, a source of huge potential future economic growth and a training ground for the next generation of creative Australians" (DCITA 2008). However, the Australian Government has released several reports over the last decade (starting with *Producing Digital Content* in 2002) that indicated the shortage of highly skilled workers was restricting the growth of Australia's games industry. See Chapter 5 for more information about these reports.

The original proposal for this study argued the games industry workforce is unlikely to reach its full potential in the near future due to two reasons:

- ◆ A lack of local, highly skilled staff to work in the high growth industry.

Over 90% of Australian games companies that participated in the Insight Economics' 2006 *Survey of Electronic Games* expected to grow over the next three years. The same survey identified 'attracting skilled staff' as the number one issue that companies face in achieving their growth objectives. At the time, the shortage of skilled staff had forced games companies to source talent from Europe and USA; made worse by local talent going abroad (Blashki 2007). In some cases, companies had to turn down good work because of a lack of capacity (Hill 2007).

- ◆ A lack of appropriately trained graduates equipped with the necessary knowledge and skills to enter the industry.

Employers in the creative industries, including the games industry, have often criticised education and training providers for producing graduates who lack the right combination of business, technology and creative skills; for not catering to the needs of industry; and for not attracting the 'right' students, particularly females. These issues contributed to "industry-based training

structures [being] frequently resourced outside the accredited skills and training frameworks, which cannot respond rapidly enough to changes in technology and industry practise" (DCITA 2005, p. 27). According to Blashki (2007), industry has also contributed to the lack of industry-ready graduates by not mentoring juniors enough, which she claimed increases the attrition rate.

The Australian Government's 2005 *Unlocking the Potential* report identified the need for robust vocational training structures and industry-based training models to address the skilling issues in the creative industries (DCITA 2005). Any such structures and models for the games industry must consider that its labour force is atypical. Cutler & Company (2002) explained this further when it stated "the games labour force is motivated by the buzz of the current project, the attractiveness of being part of a specific team environment, and the ability to recoup intrinsic creative rewards" (p. 24). A 'one-size fits all' model of education and training structures and industry-based training is not an option for the games industry.

In late 2008, the Australian Research Council Centre of Excellence for Creative Industries and Innovation (CCI) and Queensland University of Technology approved funding for this study. The Games Developers' Association of Australia (GDAA), the peak Australian body for the interactive games industry, provided the study with generous in-kind support.

2.2 Study purpose

The purpose of the *Working in Australia's Digital Games Industry* study is to:

- ◆ identify and analyse current and future skills needs and gaps in Australia's digital games industry
- ◆ determine which occupations and skills sets require employment and training focus for the labour market.

Achieving this purpose involved:

- ◆ establishing a detailed understanding of the current composition of the games industry, including current labour market conditions, skills deficiencies, and education and training provision
- ◆ analysing the gaps in the current skills makeup in light of projected future needs.

2.3 Approach

The study consists of two stages:

Stage 1: Consolidation study (this report)

This stage involved consolidating existing literature, studies, policies, programs, statistical data, and other relevant sources in the following areas:

- ◆ Definitions of key concepts relating to the games industry and skills (Chapter 2 – this chapter)
- ◆ Evolution, characteristics and performance of Australia's digital games industry (Chapter 3)
- ◆ International environment in which Australia's digital games industry operates (Chapter 4)
- ◆ Skilling of digital games workers (Chapter 5)
- ◆ Identifying potential areas for further investigation (Chapter 6).

Stage 2: Future skills strategy (next report)

Stage 1 results will inform the development of a future skills strategy for Australia's digital games industry that will include short-term and long-term solutions to address workforce development priorities and issues. It will draw on key findings from this report, a scenario planning exercise, and the study's Worker Survey to develop three to four scenarios about the state of the industry in 2015. The strategy will describe how these scenarios might affect the skilling of workers.

See **Appendix 1: Methodology** for further details about the study's approach to data collection and analysis.

The [Working in Australia's Digital Games Industry](#)

website encouraged stakeholders to share their views about the current and future state of the industry, and what this means for the skilling of workers. The site promotes the Worker Survey; provides links to games companies in Australia and overseas, job sites and career advice; and includes State, national and international research resources for the games industry and digital content industries. As at 16 May 2011:

- ◆ the site had received 4,919 hits
- ◆ the polls on the site had received 2,082 votes
- ◆ Games Developers' Association of Australia, Interactive Games and Entertainment Association, International Games Developers Association, Creative Economy (Australian Policy Online), Australian Research Council Centre of Excellence for Creative Industries and Innovation, LinkedIn's Games Dev Group, and the Australian Government's Culture Portal had promoted the study on their websites

- ◆ the site had received positive comments such as:

I've been looking around [the site] and really am impressed by the amazing content material here.

To start, allow me to point out that your internet site is fantastic. I love the theme that you have. It was very easy on the eyes. Appreciate your articles too. Definitely subscribed to your feed to make sure I won't be missing out on any updates. Excellent job! Toast to a productive business.



2.4 Key concepts

This study draws on existing definitions of the key concepts of skills, digital games, games design and developers, and digital distribution.

In the case of 'skills', the study sourced the following definitions from Shah and Burke (2003), the Australian Chamber of Commerce and Industry, Business Council of Australia, and Allen Consulting Group:

- ◆ A **skill** is an ability to perform a productive task at a certain level of competence. As a skill is associated with a particular task, a person who does not possess such a skill is unlikely to be able to carry out this task or will be less productive than somebody who does possess this skill. Skills are often associated with a qualification and its acquisition through formal education and training. However, an individual can acquire skills in other ways, including various forms of informal learning and on-the-job experience. (Shah & Burke 2003, p. 5)
- ◆ **Employability skills** are skills required not only to gain employment, but also to progress within an enterprise in order to achieve one's potential and contribute successfully to enterprise strategic directions (Business Council of Australia and Australian Chamber of Commerce and Industry 2002, p. 3). The *Employability Skills Framework* consists of the following skills and attributes:

Eight (8) key skills – Communication skills; team work; problem-solving skills; initiative and enterprise; planning and organising; self-management; learning; and technology

Thirteen (13) personal attributes – Loyalty; commitment; honesty and integrity; enthusiasm; reliability; personal presentation; commonsense; positive self-esteem; sense of humour; balanced attitude to work and home life; ability to deal with pressure; motivation; and adaptability.
- ◆ **Skills shortages** occur when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available and willing to work under existing market conditions. If the supply is greater than demand then there is a surplus. Over time, the market might adjust in a number of ways, including price and/or quantity adjustment, and the imbalance clears. Approaches taken to identify shortages and make inferences on imbalances for particular occupational groups are economic indicators (e.g. vacancy, hiring and separation rates; relative wage movements; and employment and unemployment changes) as well as employer-based surveys, interviews and focus groups. (Shah & Burke 2003, p. v, p. 18)

- ◆ A **skills gap** refers to a situation where employers are hiring workers whom they consider under-skilled or that their existing workforce is under-skilled relative to some desired level. Skills gaps do not simply relate to formal qualifications. Employees in a particular trade may possess the necessary vocational qualification relevant to their occupation, but may lack generic skills such as computer literacy, customer relations or inter-personal communication skills. For example, a group of motor mechanics employed in a garage may all possess appropriate trade certificates but some may lack communication skills, thus preventing them from contributing optimally to meeting the business's objectives.

Another aspect of a skills gap is one that Roy, Henson and Lavoie (1996) call the 'normative' skills gap. It is the gap between *what is* and *what should be*. In some instances skills gap may be latent. This can occur when employers do not perceive there is a problem because they are not fully aware of skills needed for optimal production. (Shah & Burke 2003, p. v, p. 9)

- ◆ **Recruitment difficulties** refer to the situation when employers cannot fill vacancies in spite of an adequate supply of workers. The reasons for this may be varied. They could include such things as relatively low remuneration on offer, poor working conditions or image of the industry, unsatisfactory working hours, commuting difficulties, ineffective recruitment effort by the firm, or skills needs that are very specific to the firm. (Shah & Burke 2003, p. v)

Other relevant concepts to examine skills in the digital games industry, adapted from definitions used by Allen Consulting Group (2009), are as follows:

- ◆ **Requisite skills profile** – The occupations and skills sets that games workers need to carry out their roles and duties.
- ◆ **Training needs of the current labour force** – The volume and type of skills that must be added to the current skills inventory or the existing workforce's skills if the games industry labour force is to continue to be proficient in the face of new working practices, new business needs and new market challenges. This is directly linked to the training environment and what training is actually available in the market place and what needs to be developed in order to meet changing demand.
- ◆ **Emerging skills needs** – Areas of employment in the industry where new specialisations and skills sets are expected to be created that did not exist before, due often to innovation, technological progress and/or changes in the regulatory environment.

The term “**digital games**” used in this report aims to capture:

- ◆ console based games such as Xbox, Playstation and Nintendo (commonly called video games) which can be played online or stand-alone
- ◆ games played on a PC or Mac computer, sourced from a DVD or CD or downloaded via the Internet, but not played over the Internet (commonly called PC games or computer games)
- ◆ games originating on, or downloaded to, portable formats such as mobile phones and other handheld devices
- ◆ online games which are played over the Internet:

Massive multiplayer online games (MMOGs) played over the Internet in interaction with large numbers of other players. Players typically take the role of a fictional character in a virtual world and control that character's actions.

Other Internet based games, usually ‘casual games’ found on social networking sites like Facebook and MySpace that appeal to the mass market such as trivia, puzzles and board games.

‘Advanced’ casual games, which include elements of both casual games and massively multiplayer online role-playing game (MMORPGs).

These definitions of digital games are consistent with those used by the Australian Bureau of Statistics in their inaugural 2008 report on the industry and with the terminology of industry associations.

The games described so far are intended primarily for entertainment purposes. Digital games also include **serious games**, which are designed primarily for something other than entertainment (Zyda 2005); although they can overlap with the genres of edutainment and exergaming. The ‘serious’ adjective is generally appended to refer to products used by industries like defence, education, scientific exploration, health care, emergency management, city planning, engineering, religion, and politics. According to Derryberry (2007), serious games focus on “specific and intentional learning outcomes to achieve serious, measurable, sustained changes in performance and behaviour” (p. 4). Serious game design and development normally involve game designers who want to include instructional elements within game play; learning designers who are interested in adding computer games and simulations to their learning designs; and business decision-makers who are exploring ways to reach an increasingly wired, hyper-connected workforce (Derryberry 2007, p. 1).

Examples of serious games include *America's Army* (developed by the US military), and *Secure the Deck* (developed by the Australian Defence Force), which are freely distributed “combat simulations designed to encourage players to enrol for national service in the real world” (Serious Games Institute 2010). *Darfus Is Dying* is an example of an online game that is both political and educational, designed to increase awareness of the humanitarian crisis in the Sudan, and involves players keeping their refugee camp functioning in the face of possible attack by Janjaweed militias (Darfus Is Dying 2009). *Budget Hero* is an example of a strategy and policy planning game where players raise or lower the US Federal Budget by cutting and funding particular programs, based on their values e.g. they value the importance of funding for education (Play This Thing 2008). *911 Paramedic* is an example of a casualty response game and workforce skills training game where players, as paramedics, treat critical patients on the scene and in an ambulance (Legacy Games 2010). The European Commission contributed funding of €1 million for the online game, *EnerCities*, which is a social issue game that challenges players to build a sustainable city (Intelligent Energy Europe 2009).

In recognition of the increasing demand for serious games, Ben Sawyer and Peter Smith from the US Serious Games Initiative developed a *Serious Games Taxonomy* to “get all serious games players on the same page, erase various myths about serious games, provide a snapshot for the current state of the serious games industry, find where R&D is lacking, and create a foundation for future efforts and organising” (Sawyer & Smith 2008, slide 6). Their **Serious Games Taxonomy** in **Appendix 2** includes the different genres of games (i.e. health, advergaming, training, education, science and research, production, and work) and sectors interested in particular genres (i.e. Government, NGOs, defence, healthcare, marketing and communications, education, corporate, and industry).

Advergaming are also a form of serious games as they too are not intended for pure entertainment. They are games commissioned by companies to advertise their brand, products, organisation and/or viewpoint. Anthony Giallourakis, who is owner of Advergaming.com and Adverplay.com, created the term in January 2000. Examples of advergaming include the *Pepsi Music Challenge*, 3M's Post-it Note *Draw It*, *CNN Challenge* quiz, and VW's “test drive” invitation (see the cartoon on the next page from the Knowledge Transfer Network).

Another form of serious games is **exergaming**, which is an activity that combines exercise with electronic games playing. Examples of games include Nintendo's *WiiFit*, *BrainBike XG*, and *Makoto Sports Arena*.

8

What role will gaming take in the future of marketing communications? What data is needed to enable this?



When he checks his email at home he has an invitation from VW to 'test drive' his car on Gran Turismo against competitive cars – he loves Gran Turismo, but hasn't subscribed to the PlayStation community – the teaser free games are enough, for now.

(Knowledge Transfer Network 2010)

In scoping the digital games industry, this study has excluded distribution, sales and marketing, retail, and games services companies. This study is focusing on skills required for **game design and game development**, as defined by the International Game Developers Association (2008, pp. 5-6):

- ◆ **Game Design** is concerned mainly with interaction and interface design. It is the process of crafting a system of play in which players' actions have meaning in the context of the game environment (Salen & Zimmerman 2004). Game design encompasses the set of principles, concepts, and practices that lead to the development of high-quality product. Implicit in the process of game design is the consideration of design trade-offs to allow the implementation of a game in some human playable interactive environment.
- ◆ **Game Development** is concerned mainly with the production of games, especially technologies used in creating a game. It is a process involving the interdisciplinary cooperation of technical disciplines like software engineering and creative disciplines like art and music to implement a game design in a playable real-world format (Rabin 2005). Game development often involves implementing and incrementally testing potential game elements without knowing in advance which will succeed and which will fail. It also requires knowledge of project management to ensure that a game is completed with the available resources and within acceptable time constraints.

Games Industry Consultancy (2010) defined a '**developer**' as a company whose primary business activity is writing (developing) computer games.

Developing games requires a diverse range of artistic and technical expertise including game design, music composition, graphical art/design, AI and programming (coding) ability. Some publishers have in house development teams, some use third party developers - most publishers use a mix of the two.

Digital distribution is the principle of providing digital information and content over the Internet in the form of products or services, including games (Babylon 2010). Digital distribution of games allows developers to bypass publishers, providing them with the freedom to develop and own their content. Developers can promote their games more effectively at lower cost; use new business models, such as microtransactions; and more easily monitor game sales and player statistics. Digital distribution provides consumers with a more convenient way to access games and start playing games (as there is no need to set up hardware or install discs); and cloud ownership/activation of the digital content avoids the issue of damaged or lost discs (Ployhar 2010). Finally, digital distribution is more eco-sensitive, leading to a reduction in hardware obsolescence (Moore 2009) and savings on packaging and shipping (Ployhar 2010).

The Knowledge Transfer Network (2010, p. 3) in its report, *Creative Industries KTN: Final Beacon Report*, also identified opportunities that the "radical transformation of digital content" offers games developers:

- ◆ An opportunity to migrate from console platforms to cloud-based applications and casual gaming communities
- ◆ An opportunity to substantially alter existing business models and markets
- ◆ An opportunity for inter-disciplinary collaboration to establish mutually beneficial models of working. For example, TV producers can explore how games designers have created content that now generates more revenue than Hollywood films. Similarly, games developers can continue to explore how to enhance storytelling and character development within their genre.

A worker who participated in the Worker Survey for this study described the impact of **digital distribution** on the games industry:

Digital distribution will be the biggest change in the industry. Developers will have direct access to the market place, which is something they have never had before. The ones who will become successful are the ones who can make compelling, fun and original IP. Studios' success will be more based on the quality of their games rather than "who they know" or whether they can produce games on time. This is going to be the biggest shift and it should see more good games coming out of Australia, even if it means some of the bigger, older companies may go through difficult times.

However, Keri Honea in her article, *Movement Toward Mainstream Digital Distribution*, argues that the 'cons' of digital-only games far outweigh the 'pros':

There are already plenty of reasons to love digital-only games: There's no disc to break or scratch; developers can see accurate, live data on how successful their game is and make the money they rightfully deserve; an old or unwanted game can be deleted instead of dragged to the store or left to collect dust on the shelf. Currently though, the cons far outweigh the pros. Many gamers, myself included, like the feeling of "ownership" a physical copy of the game gives you. I like the boxart, seeing the case on my shelf, and I like loaning my games out to friends. A few of my friends are currently borrowing several of my games that they are not sure if they want to buy (for example, our own Matthew Green is borrowing my copy of Heavy Rain) or can't afford to buy at the moment. If I only had digital distribution, I couldn't loan Matt Heavy Rain and therefore couldn't have set up a bet on whether he will like it or not. Digital distribution needs an ability to loan games to Xbox LIVE and PSN friends for, let's say, 10 to 14 days. During that time, the original buyer of the game would relinquish their rights to the game and would not be able to play it, much like how Barnes & Noble's Nook lends e-books to other Nook users.

- ◆ Some of the concepts defined in this chapter include 'skills', 'skills shortages', 'skills gaps', 'emerging skills needs', 'digital games', 'serious games', 'game design', 'game development', and 'digital distribution'.

2.5 Chapter summary

This chapter focused on the rationale for undertaking the study as well as the study's purpose, approach and definitions of key concepts. Key findings are as follows:

- ◆ This study was initiated in response to concerns that Australia's games industry would not reach its full potential in the near future due to a) a lack of local, highly skilled staff to work in a high growth industry; and b) a lack of appropriately trained graduates equipped with the necessary knowledge and skills to enter the industry.
- ◆ The purpose of the study is to a) identify and analyse current and future skills needs and gaps in Australia's digital games industry in order to b) determine which occupations and skills sets require employment and training focus for the labour market.
- ◆ The study consists of two stages: Stage 1: A consolidation study to draw together existing literature, studies, policies, programs, statistical data, and other sources relevant to the skilling of digital games workers (this report); and Stage 2: A future skills strategy for Australia's digital games industry that involves a scenario planning exercise (next report). The strategy will include short-term and long-term solutions to address workforce development priorities and issues for three to four different scenarios of the state of the games industry in 2015.

3. Australia's digital games industry

This chapter of the report consolidates literature, studies, data, and other sources of information about the evolution, characteristics and performance of Australia's digital games industry. The following chapter (Chapter 4) consolidates sources relevant to the international environment in which Australia's digital games industry operates.

3.1 Evolution

Media historians argue that new technologies both shape and are shaped by social processes (Kerr 2006, p. 12). Contemporary histories of digital games however, are often dominated by chronological accounts, emphasising names, dates and eras. For example, the online history, *Playing the game*, by media analyst Vogel (2001), charts a smooth and logical history where technological advances interact with neutral market forces. No mention is made of the socio-political context in which games evolved, replicating particular cultural values in the process, or of game development in non-Japanese Asia. Similarly, the popular illustrated guide, *High Score!*, walks the reader through the decades, starting with the 70s, and going on to the 1980s, 1990s, and eventually, the 2000s. It goes into detail what was happening during each decade and who the leading companies were during each time. Journalist Steven Poole's *Trigger Happy: Video games and the entertainment revolution* originally published in 2000 aims to describe the history and evolution of the games industry, including gaming culture, production styles and influences in an entertaining way.

Parikka and Suominen (2006) summarised the standard historical storyline as follows:

Computer researchers in the U.S. needed to test (and wanted to play with) their machines in order to find new uses and interfaces, and so they created games to test them. The 1950s and 1960s were the pioneering era of computing, involving large investments in research and design. Existing batch processing computers were challenged by ideas of interactive computing creating an active feedback loop between the user and the machine. One expression of this atmosphere of enthusiasm was the space battle game Spacewar (1961; 1962), often touted as the first modern computer game ever (Levy 1984; Herz 1997; Aarseth 2001; Burnham 2001; Kent 2001; DeMaria & Wilson 2002). Since the early years, the written histories as well as chronologies and timelines on the Internet offer narratives of progress in hardware from the arcade to video games, up until the computer game boom of

the 1980s, the consoles of the 1990s and the mobile game enthusiasm of the 21st century. This technological viewpoint is complemented by another narrative mapping of software history from Spacewar to Adventure (1977) and onto Tetris (1985) and Myst (1993) presenting genre classifications and analyses of games.

Sociologist Kerr (2006) points to alternative histories which attempt to establish why digital games emerged in the United States when they did, and how each socio-cultural paradigm shaped the subsequent innovation trajectory. For example, Haddon (1988; 1993) and Kline, Dyer-Witheford & Peuter (2003) described the origin of digital games in the highly masculinised worlds of military-space research and university computing departments. This, they argued, shaped the subsequent development of game genres.

It is worth observing the cultural intertwining of the West and Japan in the development and design of digital games. Unlike more traditional forms of popular culture in the West such as film and television, the digital games industry has historical and cultural roots as well as strong business interests in areas outside of the West, and in particular in Japan. That influence and power extends to Japanese companies (such as Nintendo, Sega, CapCom, and Square Enix), Japanese visual styles (such as super-deformed characters and anime-like images), as well as an extensive list of games that have influenced successive generations of game designers around the world.

A key trend over at least the last 10 years has been the increasingly global nature of the digital games industry (Kerr 2006). Publishing companies in London, Los Angeles and Tokyo for example, interact with globally dispersed hardware, development and supplier companies: "While one individual may create the vision for a game, the production of a game is a team-based process shaped by many individuals, the working culture and crucially the relationship with a publisher" (Kerr 2006, p. 75).

Economic geographer Jennifer Johns (2006) has conceptualised production networks of the video games industry by examining its evolution into a multi-million dollar industry. By so doing, Johns explicates the geographically uneven impacts of globalisation processes. Johns argues that while hardware production is organised by console manufacturers using truly global sourcing strategies, the production of software is far more complex. Johns says software production networks are bounded within three major economic regions: Western Europe, North America and Asia Pacific. Just as value is spread unequally across the software production cycle it is highly spatially uneven. Several key nations and cities dominate various stages

of the production network. These markets are served by key centres of production located across the United States, Europe and Japan, following the technological division of the globe into three regions.

All 20 of the “Top 20” digital games publishers originate in the United States, Japan or France, each representing the central hub of their respective digital games economic region. According to Johns (2006), this highly uneven distribution of firms also occurs within the development stage of production, although to a lesser degree. She says “the causes of this concentration of activity are related to a number of factors, including the evolution of the industry, the unequal distribution of global capital and more complex notions of cultural embeddedness” (Johns 2006, p. 165). It is this embeddedness that affiliates territories within each of the major regions of Western Europe, North America and Asia Pacific. The close cultural proximity of the United Kingdom, United States and Australia poses opportunities for spanning the supra-regional divides that are otherwise maintained by games developers and consumers alike.

The spatial inequalities in the distribution of benefits related to innovative products produced across national and firm boundaries were examined by Linden, Kraemer and Dedrick (2007) in their case study of Apple's iPod. The Apple Inc. iPod was designed by an American firm, assembled in China, composed of parts from Japan, Korea, and the United States, and uses iTunes software developed in the United States. They concluded:

No single country is the source of all innovation and therefore US companies need to work with international partners to bring new products to market. These companies will capture profits commensurate with the extra value they bring to the table. This is simply the nature of business in the 21st century.

(Linden et al. 2007, p. 10)

Australia has been making digital games for an international market since games moved from the arcades to home computers and consoles in the early 1980s. A 30-year history can be traced to Beam Software which secured the licensing rights to *The Hobbit* in 1981. International critical and/or commercial successes originating in Australia include:

- ◆ Atari - PS2 *Grand Prix Challenge*
- ◆ Auran - *Dark Reign*
- ◆ Blue Tongue - *Jurassic Park - the game*
- ◆ Krome Studios - *Ty the Tasmanian Tiger*
- ◆ Ratbag - *Dirt Track Racing*

- ◆ Tantalus - *Top Gear Rally*
- ◆ Torus Games - Gameboy titles including *Lion King*, *Doom II*, *Minority Report* and *Jackie Chan*.

(Australian Government Cultural Portal 2007)

Competitive advantages for Australia include its cultural affinity to the large markets of the United States and United Kingdom; geographic proximity to the economic power-houses of Asia; and lower production costs compared to the United States and Europe (Australian Government Cultural Portal 2007).

The Australian Centre for the Moving Image (2008a) has documented what they call “the inside story of game development in Australia” told in terms of “pioneering individuals and families, of the companies they established and the teams of people that came together to create videogames for a competitive international market”. The Game Developers' Association of Australia (2010) described the local industry as follows:

Australia has a dynamic and sophisticated game development industry. With experience developing and marketing products for the largest game publishers in the world, Australia offers the best in creative talent, advanced technology and management experience. Australia also has a strong base of complementary creative industries, including film and television, design, advertising and new media. Our education and training courses are world class ensuring that the talent supply continues to grow and meet future market needs.

3.2 Industry size and employment

In April 2008, the Australian Bureau of Statistics (2008) released its first issue of *Digital Game Development Services, Australia*. As at June 2007:

- ◆ 45 games development businesses operated in Australia, with three-quarters of these businesses operating in Victoria, New South Wales and Queensland (Figure 1)
- ◆ 695 of the 1,431 workers employed in the games development industry were located in Queensland (Figure 2), which represents 48.6% of all workers in Australia
- ◆ Artists, animators and programmers combined accounted for 63.5% of games workers, and non-residents accounted for 6.1% of games workers (Figure 3)
- ◆ 1,232 males worked in the industry (Figure 4), which represents 86.1% of all workers.

- ◆ 151 females worked in the industry, which represents 10.6% of all workers. By employment type, females accounted for 6.3% of owners, partners and salaried directors; and 31.8% of workers employed on a permanent part-time basis (Figure 4).

As part of its review of Australia's digital games development industry, Innovation & Business Skills Australia (2009) located 62 digital game development and directly related media companies, of which:

- ◆ 46 were small businesses employing less than 5 workers
- ◆ 11 were small to medium-sized businesses employing 6 to 50 workers
- ◆ four (4) were medium-sized businesses employing 50 to 200 workers
- ◆ one (1) was a large business employing over 200 workers.



Figure 1. Number of games development businesses by location, June 2007



Figure 2. Number of games workers by location, June 2007

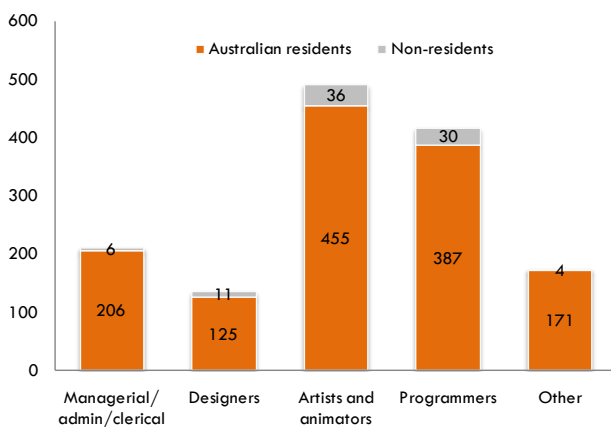


Figure 3. Number of games workers by occupation and residency, June 2007

(Australian Bureau of Statistics 2008)

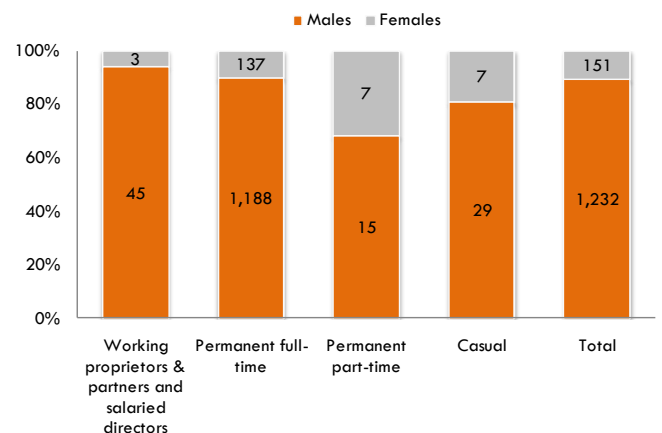


Figure 4. Number of games workers by employment type and gender, June 2007

Information on current salary levels by occupation is limited. As a result, this study has drawn on median salaries of workers who responded to this study's Worker Survey; salary information from Insight Economics' 2006 *Australian Electronic Game Industry* report; and salaries included in Seek job advertisements (note, many advertisements do not include a salary figure, instead referring to competitive/excellent salary, benefits and/or bonuses).

- ◆ Median salaries of the 56 workers who responded to this study's Worker Survey ranged from \$50,000-\$59,999 for product testers to \$100,000 and over for managers/executive directors/CEOs. The survey also found considerable variation in salaries for some occupations. For example, salaries for software programmers ranged from \$30,000-\$39,999 to \$90,000-\$99,999, and salaries for managers/executive directors/CEOs ranged from no income (\$0) to \$100,000 and over.

- ◆ As at November 2006, salaries in large games companies ranged from \$36,000 a year for junior artists to \$140,000 a year for studio directors (Figure 5). Salaries of workers in small companies were generally lower than salaries of workers in large companies (Insight Economics 2006).
- ◆ A search of job advertisements with a salary figure mainly located jobs for programmers – PHP Developer Online Games (\$45,000-\$80,000 depending on experience), Software Developer Casual Gaming (\$55,000 + benefits), Flash Developer (\$60,000-\$80,000 depending on experience), Mid-level Developer (\$65,000-\$80,000 base, bonuses + salary reviews), and Java/J2EE developer Online Games (\$70-\$75 per hour). Other occupations with a salary figure were Technical Operations Mobile Games (\$45,000-\$59,999), Games Artist (\$80,000), and Integration Engineer (\$80,000).

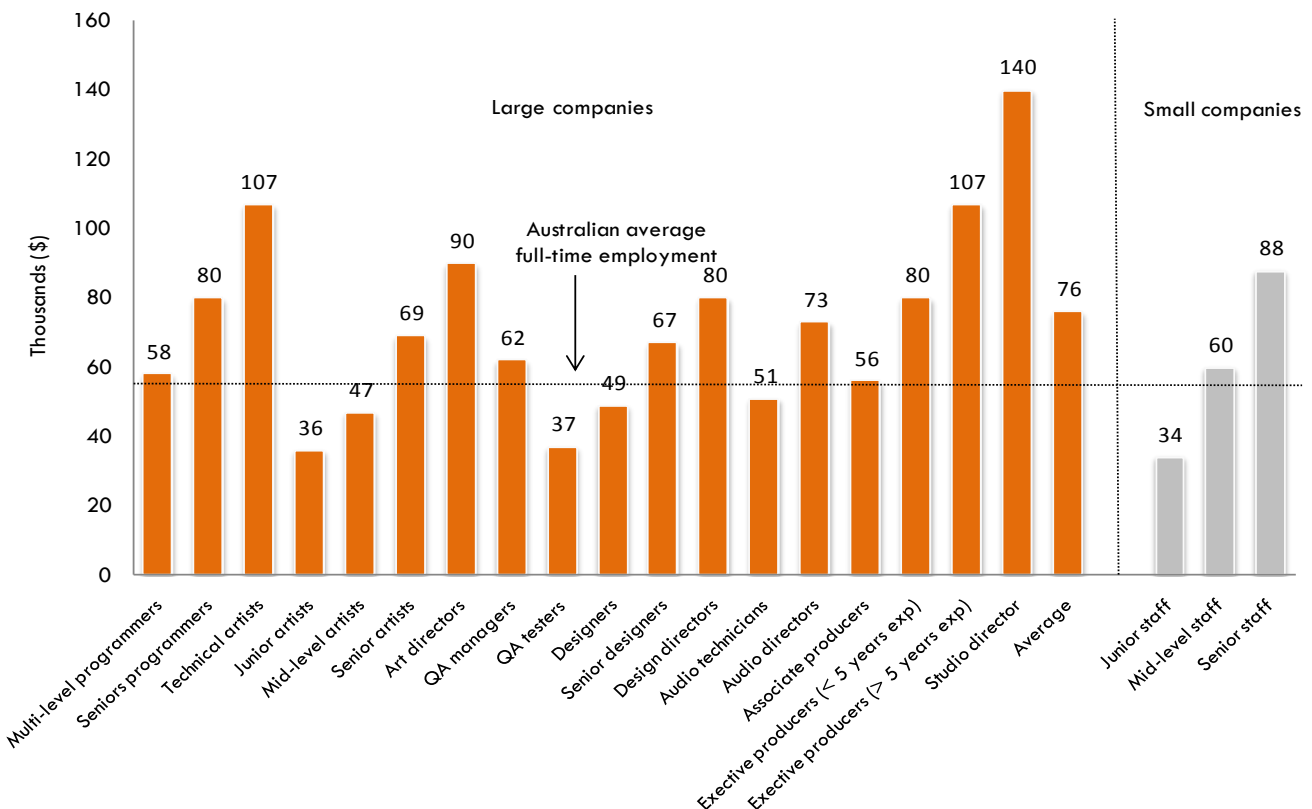


Figure 5. Average salaries of games workers by occupation and company size, November 2006
(Insight Economics 2006, p. 8)

3.3 Industry performance

Digital game development businesses in Australia generated income of \$136.9 million in 2006/2007 (Figure 6), with Queensland and Victoria combined accounting for 73.7% of income. Income from consoles of \$83.2 million (Figure 7) accounted for 71.1% of games development income by format. Overseas businesses and individuals were the main source of income for digital game development businesses in Australia (Figure 8), accounting for 79.1% of income in 2006/2007 (Australian Bureau of Statistics 2008). The Innovation & Business Skills Australia (2009) estimated annual industry revenue of \$161 million.

Revenue from Australia's video games industry consists of revenue from retail sales; development and manufacture of games, consoles and accessories; and subscriptions to online gaming (IBIS World 2010). As a whole, the industry generated revenue of almost \$3.6 billion in 2010. Revenue has grown at a rate of 16% annually for the five years to 2010-2011. Increasing demand by households for games has contributed significantly to higher industry revenue. The *Interactive Australia 2009* study that involved a survey of 1,614 adults in July 2008 found:

- ◆ 88% of Australian households have a device for playing computer games compared to 76% in 2005
- ◆ 60% of game households are home to two or more gamers
- ◆ 70% of parents in game households play computer and video games
- ◆ females account for 46% of game players compared to 38% in 2005
- ◆ the average age of game players is higher at 30 years compared to 24 years in 2005
- ◆ 51% of seniors aged 65 and older play computer games.

(Interactive Entertainment Association of Australia 2008)

PricewaterhouseCoopers in its *Global Entertainment & Media Outlook 2010-2014* report includes consumer spending in Australia on console games (including handheld games), online games, wireless games and personal computer (PC) games. As shown in Figure 9, spending by Australians on games rose from US\$617 million in 2005 to US\$1,071 million (or just over US\$1 billion) in 2009. PricewaterhouseCoopers (2010) predicts consumer spending on games in Australia will increase to US\$1,584 million in 2014, due mainly to greater demand for online games and wireless games.

Estimated compound annual growth in consumer spending for online games (13.6%) and wireless games (13%) for the period 2010 to 2014 is significantly higher than estimated compound annual growth for

consoles and handheld devices (5.8%). As a result, online games and wireless games will continue to gain market share over the next five years (see Figure 10).

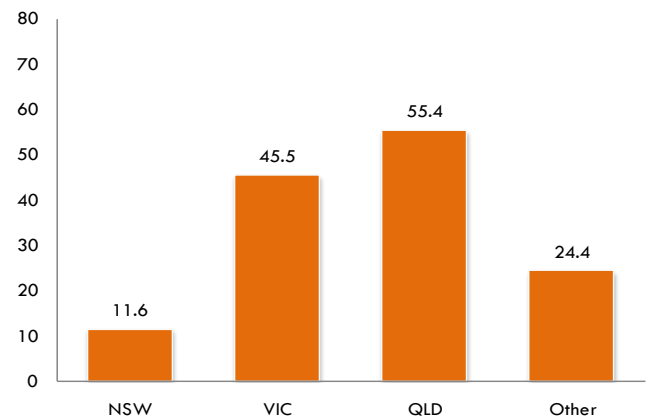


Figure 6. Total income of digital game development businesses by location, \$ millions, June 2007

(Australian Bureau of Statistics 2008)

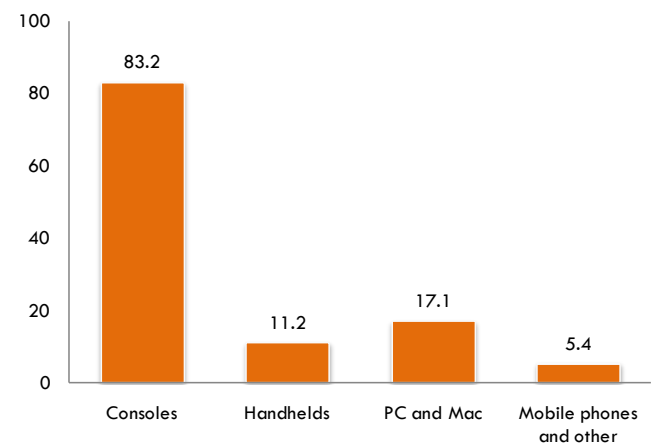


Figure 7. Total income of digital game development businesses by format, \$ millions, June 2007

(Australian Bureau of Statistics 2008)

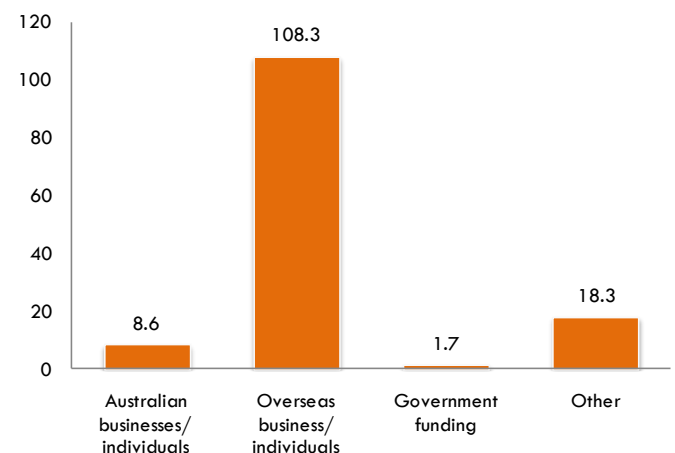


Figure 8. Total income of digital game development businesses by source, \$ millions, June 2007

(Australian Bureau of Statistics 2008)

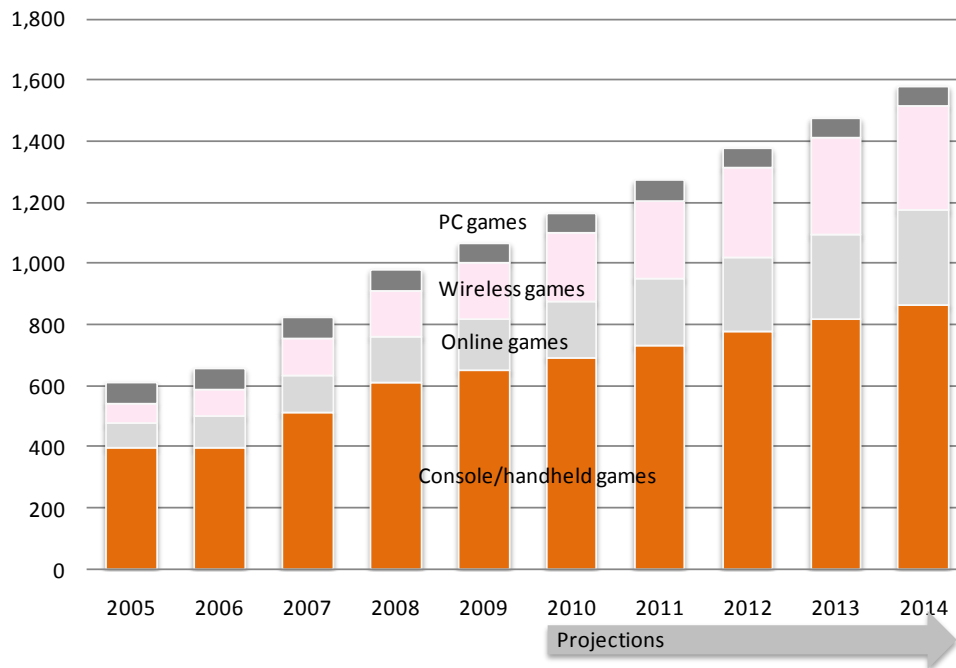


Figure 9. Consumer games spending on video games, Australia, \$ millions, 2005 to 2014
(PricewaterhouseCoopers 2010)

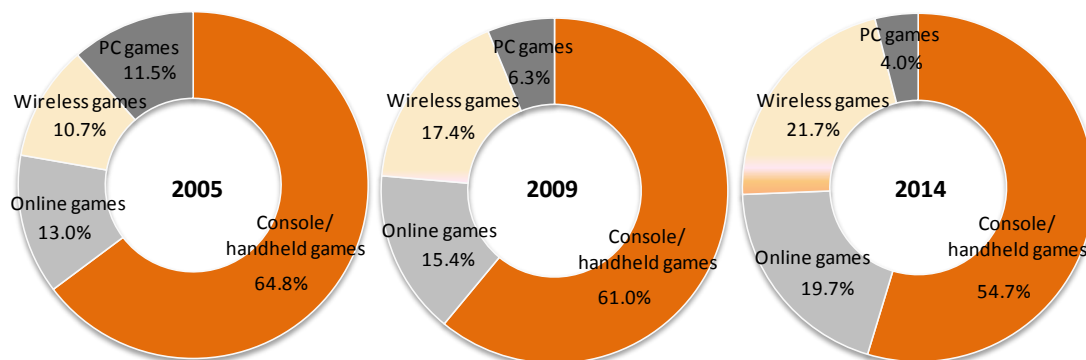


Figure 10. Video games market by component, Australia, % of market share, 2005, 2009 and 2014
(PricewaterhouseCoopers 2010)

However, the extent to which games developers in Australia will benefit from further increases in consumer spending on the video games industry is uncertain. Similar to other countries with an established games industry, the Global Financial Crisis (GFC) contributed to lower revenue, job losses, and business closures in Australia in 2008 and 2009. There are different views about the impact of the GFC on the games industry and timeframes for recovery as indicated by the articles in Table 1. Some commentators have stated that the Australian industry is “moving from strength to strength”, “weathering the storm”, “continuing to expand”, and “resilient”. Others have said that the industry is in “crisis”, 2009 was a “very stressful year”, there is a “lack of job opportunities”, and “we were hit quite hard by the GFC and we're still feeling the effects today”.

The article by Tim Colwill from games.on.net states the GFC affected some companies much more than others. General Manager of Creative Assembly, George Fidler, attributed the downturn in the industry also to businesses becoming “unprofitable in recent years” and the GFC was the “final nail in the coffin”. GDAA's Tony Reed predicted that Australia's digital games industry would recover by the end of 2010. However, Tsume reported in October 2010 that Krome Studios had closed its Adelaide studio, let go of its remaining staff after making earlier cuts over the previous 12 months, and rehired some staff as contractors to finish remaining work. At its peak, Krome Studios had employed around 400 people. But in the view of some industry luminaries, such as Steve Fawkner, there is now a new, stronger industry with a focus on small teams and new platforms, whose investment potential is staggeringly bigger than that of its predecessor.

Table 1. Articles on the state of Australia's games industry, 2009-2011

7 May 2009, *The Future of the Games Industry*, Keller (2009a)

Australia's game industry is moving from strength to strength. Despite mass layoffs in many of the big name game developers and publishers overseas coming as a result of the global economic downturn, Australia's game development industry is continuing to expand, and as we'll see today, there's plenty to look forward to coming from our local talent. Keep in mind that this is only a small sample of what's on the way – there's games such as *Heroes Over Europe*, *AFL Challenge*, *Rugby League Challenge*, *Transformers: Revenge of the Fallen* and more coming over the next few months. Many studios also have games which haven't yet been revealed, or aren't in a state to show off just yet.

16 October 2009, *Gamesindustry.biz interviews Tom Crago on how Aussies devs are faring*, Tsume (2009)

According to CEO of Tantalus, Tom Crago: "We've been relatively resilient – certainly we've felt the effects of the downturn, and I'm sure most Australian companies are finding it more difficult to procure pay-for-service work than in the past. But we're weathering the storm – with the exception of Pandemic closing, there have been no casualties in the Australian market."

23 October 2009, *Australian video game developer collapses, industry in crisis*, Stafford (2009)

The Australian video game industry is in crisis, with one development company falling into liquidation and another reportedly laying off approximately 30 staff. But the company has clearly been struggling. Earlier this month it laid off about 30 staff, due to the cancellation of a potential title with George Lucas's entertainment company Lucas Arts. Transmission, which developed for the Wii, Playstation 3, Xbox 360 and PC platforms, created titles including *Ashes Cricket 2009* and WWII game *Heroes Over Europe*. It also gained recognition for its popular AFL titles and became one of the larger Melbourne studios with over 135 employees at its peak late last year.

4 November 2009, *Transmission ends: reflections on Australia's digital games industry*, The Age (2009)

Thuyen Nguyen's love letter to video games, *The Most Powerful Person in the World*, has received 100,000 views on YouTube. But now Thuyen finds himself working in telecommunications, forced out of the games industry that he loves because of a lack of local opportunities: "Having spent almost three months looking for work in Melbourne, I found nothing despite seven years experience and eleven published titles under my belt. Of course, I was surprised and frustrated – the former especially so, because I kept on getting the same reason for rejection: Not enough experience. no senior roles, no designer roles. The global financial crisis forced me to leave the industry I started my working life in, and one which I still adore. Though I must admit, having taken a job in the "real world", I'm glad I don't have to compete with the newly-retrenched game developers who are now fighting for the small number of jobs available at this time."

11 Dec 2009, *State of the Game: Part 1 Victoria* and 17 Dec 2009, *State of the Game: Part 2 Queensland*, (Keller 2009b; 2009c)

Tim Colwill from games.on.net described 2009 as a very stressful year. He interviewed major players in the Australian video game industry as part of his two articles to see "how they

were faring, and what they were looking forward to for the year ahead". Key findings from these interviews are as follows:

- *BigAnt* - is in a position for a very successful new year.
- *BlueTongue* - has remained largely unaffected by the downturn in the global economy.
- *Firemint* - in contrast to the rest of the industry, currently is hiring more developers.
- *Infinite Interactive* - with a studio size of around 40, these six layoffs represent a significant portion of their workforce. Despite this, Infinite does have a strong release line-up planned for next year.
- *Red Tribe* - 2009 was a quiet year for Red Tribe - no games were released. At least the studio seems to be alive, if not kicking.
- *Tantalus* - though it's been a tough year for Tantalus with many titles put on hold ... it still managed to rack up sales of close to, or over one million units each for three separate title. At least four new games planned to ship in 2010, including two large, unannounced movie properties.
- *Torus* - has spent 2009 busily beaver away on their game engine and tools development. Torus would be able to make some big announcements come February.
- *Transmission Games* - one of the unfortunate casualties of the global financial downturn ... closed its doors and went into receivership in October of 2009, putting their 100-odd employees out of work.
- *Wicked Witch Software* - if [their] sports license successes are any indication, we can be sure that Wicked Witch will continue to grow strongly in 2010.
- *Auran* - technically, Auran Games is still running, although they did not return any of our calls or emails. Even so, Auran are still pumping out content for their well-known *Trainz* franchise.
- *Fuzzy Eye Studios* - had to "let go the majority of staff" in order to reduce operating costs and stay active.
- *Halfbrick* - had a very successful year in the digital downloads arena ... [pushed] through the economic storm of 2009. No projects have been cancelled and it's been sound business as usual.
- *Krome Studios* - were forced to lay off around 30 staff from their Brisbane and Melbourne offices. Morale remains high among the Krome staff we spoke to, though that morale is now tempered with a greater sense of realism about the industry.
- *SEGA Creative Assembly* - appear to have shaken off the bad economics of 2009 ... [weathered] the storm so far.
- *THQ Studio Australia* - it's certainly going to be a big year next year for THQ.
- *Pandemic* - with first the Brisbane studio closing in February and the rest of the company internationally in September, 2009 has been a terrible year for the people at Pandemic Studios.

7 February 2010, *The Australian Game Development in 2010*, Gamesspotau (2010)

CEO of Interactive Games and Entertainment Australia, Ron Curry, also recognises that while the Australian games market did reasonably well against the global recession, developers in Australia have had it tough in the past year. "On the upside

we have seen the Australian market remain fairly resilient this year," Curry said. "In an environment where the international markets have shown a decrease in sales against last year, Australia has held its own. Secondly, we have finally seen the Australian Government take a leadership role in having a public consultation on an R18+ classification for video games.

"Conversely 2009 was a tough year for developers, and we sadly saw the loss of some studios and a winding back of others. These closures saw talented Australians out of a job and trying to find employment in a very tough local environment; one that doesn't operate on a level playing field. Unlike other territories such as Canada, the Australian Government continues to resist the call for screen production incentives and producer offsets."

But some developers believe the global financial crisis is not the only catalyst for the downward spiral in Australia's game development industry. George Fidler, general manager of Sega's Brisbane-based studio Creative Assembly, says the majority of developers and publishers in the local industry have become unprofitable in the last few years.

"Last year was the toughest year I've experienced since joining the industry in 1989," Fidler said. "But I don't think we can blame it all on the global financial crisis. The fact is many developers and publishers have made losses of a magnitude never before seen in our industry. The consequences have been huge layoffs and studio closures. For many years we considered the video games industry to be recession proof. Clearly, that is no longer the case. The global financial crisis was, in my opinion, the final nail in the coffin."

Looking ahead, Fidler believes it's not all bad news for Aussie developers. He says new and exciting secondary markets are emerging, which involve lower development costs and can therefore afford to attract a high degree of innovation.

11 May 2010, Editorial: The State of Australia's digital games industry, Kolan (2010)

Is it possible that, while we've been sitting on our couches delving into the latest and greatest games from the world's biggest developers, Australia's digital games industry is on the brink of collapse? A slow, secret death that is not only affecting the lives of games industry employees, but completely undermining the long-term health of the Australian game design community? That's the dark-hued question at the front of my mind this week after the latest spate of corporate downsizing – this time from Krome Studios. What the heck is going on?

In times of economic instability, when companies are looking more and more closely at the bottom line (and weighing up operating costs against the risks they're facing), taking a punt on a major project offers great rewards, but at the same time, poses massive risks – the kind that destabilise entire businesses, as we've seen. Over the last four years, there have been a number of high-profile collapses and downsizes in Australia. Of these, arguably the biggest was the folding of Pandemic's Queensland branch.

[GDAA's, Tony Reed] explains, "We were hit quite hard by the GFC and we're still feeling the effects today. The strength of our dollar hasn't helped either. The global game development industry continues to reel from studio closures and massive job losses, and the levels of investment into the game development sector are still a fraction of what they used to be."

Off the back of a stabilising market, Reed sees a strengthening of the Australian games development market by

the closing of 2010, which, in our view, seems slightly premature – but would be a great scenario for employees and companies: "It is my personal belief that by the close of 2010 the Australian game development industry will have a very clear agenda and have begun the march to once again become one of the most acclaimed game development territories in the world."

15 October 2010, Krome Studios to close doors on Monday, contractors will continue work, Tsume (2010)

The rumours began with more drastic job cuts today (confirmed to be hitting both the remaining Melbourne and Brisbane studio), but it seems to be a lot more serious for the studio than that. The current report is that Krome Studios have let go of all remaining staff, including those in their base studio in Brisbane, and will be closing their doors on Monday. Some staff will be rehired as contractors to finish some remaining work. The latest developments at Krome Studios ends a tumultuous twelve-month period for the company which had started to dwindle down as the global financial crisis hit after having just reached a milestone of 400 employees.

Beginning with the axing of 60 employees in November 2009, the company shed an additional 50 employees in April this year. Four months later in August, an undisclosed but estimated 100+ employees were further let go from Krome, marking the end for the Adelaide branch of Krome Studios. While admirable attempts to save Krome Studios Adelaide proved unsuccessful, the closure of the both the Adelaide and Melbourne arms of Krome Studios will mark the final end for the Ratbag Games and Melbourne House legacy. Krome Studios acquired the iconic 80's games developer, Melbourne House, in late 2006 from previous owner, Atari, while a studio was opened in Adelaide by Krome to accommodate the remaining Ratbag Games staff who were left unemployed after Midway closed down the Powerslide developer in late 2005.

9 February 2011, Australian Interactive Game Sales Reach \$1.7 Billion in 2010, IGEA (2011)

Australia's interactive games and entertainment industry has recorded sales of approximately \$1.7 billion for the 2010 calendar year, a 16 per cent decline from the corresponding 2009 period.

The data compiled by independent market research group GfK Retail and Technology Australia includes all sales from hardware, gaming peripherals and traditionally boxed software sold through retail outlets, yet excludes revenue generated from online retail sales, downloadable content, online games subscriptions and games delivered to mobile devices.

Ron Curry, CEO of the Interactive Games & Entertainment Association, says despite the dip in sales Australia's video and computer games industry remains buoyant compared to overseas gaming markets, which have not witnessed sales increases, as Australia did, over the past two years due to tough economic conditions.

"Compared to the most other international territories, our local interactive entertainment market has done considerably well to weather the global economic crisis which affected a broad range of entertainment industries and what we are seeing now is a levelling or righting of the market."

"Innovation continues to thrive and millions of Australian families are engaging with games through multiple formats whether it's on a mobile device, online subscription or in more traditional PC and console formats," said Curry.

"As the industry continues to evolve and interactive entertainment is delivered through increasingly diverse channels, it becomes more difficult to aggregate sales data through a single source. Anecdotally, sales of interactive entertainment products are continuing their healthy growth; however, the ways these products are being consumed and engaged with is expanding and changing dramatically, as is the industry itself."

"Digital downloads, online subscriptions, micro and mobile games and alike are expanding consumer spend into areas that we are unable to measure in the traditional manner. 2011 will continue to see consumers investing in a wide range of interactive entertainment offerings which will further strengthen the ongoing success of the industry," said Curry.

For the third year in a row, GfK data reveals 'Family Games' were the best selling genre composing 21 per cent of the number of console game units sold followed closely by 'Action Games' at 20 per cent.

16 March 2011, *The Past and Future: Industry Experts Weigh In*, Gamesspot.au (2011)

While all four luminaries recognise the impact the global financial crisis had on the Australian development industry - sending it into a spiral of debt, cancelled projects, staff layoffs, and numerous studio closures - most believe that it also brought with it some good. Fawkner believes that something large and unfortunate happens in the industry around every five years.

"Unsurprisingly, this trend every five-year period coincides with the middle of a console/hardware cycle," he says. "A generation of consoles has become established, publishers acquire some key developers, and external/independent studios feel the pinch as their work is taken away and given to these new internal studios, or outsourced to cheaper locales. I think that we reinvent ourselves every time this five-year cycle hits, and that is when we, as an industry, go through a painful rebirth process."

George Fidler left EA to set up and run Creative Assembly's Brisbane studio, where he worked on *Rome: Total War*. New platforms, new distribution methods, and most importantly new IP, is the way forward for the industry. With the Australian dollar going from strength to strength, it is not hard to believe that the industry's work-for-hire days can soon be left completely behind.

"I do believe we've had an over-reliance on work-for-hire," Fawkner says. "I certainly don't think we should have ignored it - it has kept our industry alive for many years. I just think we could have taken a few more chances to establish some more original IP in this country. I think a few Australian studios will emerge over the next few years that are very strong, creatively and financially. I think there will also be many smaller studios that spring from them, and hopefully the professional creative culture will filter down."

"With the revolution in digital distribution, we don't need to be close to the retail locations in the USA or Europe to effectively distribute there, so that barrier is growing weaker all the time, and that has been one of the key things holding us back. As far as direction goes, I think it is as simple as three things: games should foster community, not isolation; they should be provided as a service, not a product; and every game should be polished until it hurts."

Fidler believes the last few years have seen huge changes in the local development scene, with large titles and big budgets replaced by smaller studios and the emergence of strong casual and social games. While some see this as a negative,

Fidler says this change plays to the strengths of the local industry.

"These kind of games focus on gameplay innovation, rather than huge production values; they also allow developers to access markets directly, rather than having to rely on large multinational publishers. Consequently, we're now seeing a migration of game developers from the old industry, to the new, including myself. We are now considered world-class in this space, and we've had more success in this market than in any other. It's amazing."

Like Fawkner, Fidler sees original IP as the key to the future success of the Australian game development industry. He believes studios must move away from the work-for-hire model and look towards creating original properties.

"In the past, this has been difficult for two reasons: a lack of local venture capital and huge development budgets. It cost tens of millions of dollars to make video games. The budgets for casual and social games are much lower, which gives us the opportunity to fund projects ourselves. I think social-game mechanics are pervading every genre, on every platform of interactive entertainment. Electronic marketing and distribution, lower purchase prices and revenue streams, from in-game purchases and advertising are all here to stay."

Despite things like the GFC and a global industry shift towards producing bigger, more blockbuster-type titles, Passfield believes the iPhone was the real catalyst for change in the Australian game development industry. He says it has grown to include more avenues of distribution and development, such as casual games, the free-to-play model, and mobile games.

"To be honest, the old industry was heading into a meltdown anyway. The focus was shifting toward games like *Call of Duty* with movie-sized budgets and long production times, a model which can only support a few big developers. The iPhone gave developers like Firemint and Halfbrick the chance to do something that no Aussie developer has done - create major hit games on the world market. When Steve Ballmer singles out your game (*Fruit Ninja*) in a keynote success, or when Ellen DeGeneres does a comedy sketch around your game (*Fruit Ninja*, again) you know you have made an impact on pop culture."

There is no longer a question of whether or not the Aussie industry is thriving; according to Passfield, this is not the same industry that had its beginnings in the '80s. This is a new, stronger industry with a focus on small teams and new platforms, whose investment potential is staggeringly bigger than its predecessor.

"I would argue that we, as an industry, are more successful than ever. Will we have 300-plus person studios again? Probably not. But I never saw that as a sign of success. What I count as success is high quality games in the top 10 around the world and great return on investment. It's easy to work out what should have been done in hindsight. What is important is for those still stuck in the old way of thinking to change quickly - embrace digital distribution, embrace metrics, explore free-to-play models and social play. Don't stick your head in the sand waiting for the old industry to recover."

"Things are moving so fast that most of what I say today will be irrelevant tomorrow, but the one thing I can guarantee is that we will continue to experience rapid change. Every developer needs to keep their eye on emerging trends and react fast. One thing I've learnt over the last 25 years is to stay nimble - you never know what is just around the corner".

Another useful but older source on the performance of Australia's games industry is the report, *Playing for Keeps: Challenges to sustaining a world-class UK games sector*, released by UK Trade & Investment in October 2007. This report includes performance ratings for seven countries, including Australia as well as a SWOT analysis for each country (see country comparisons in Chapter 4). Figure 11 shows Australia's performance for five ratings. The report justifies the low-medium ratings for Australia as follows:

- ◆ Maturity rating (4/10): Despite its age, the sector is small and slow growing, creates few AAA IPs, and is largely license-based
- ◆ Innovation rating (3/10): Low ability to create new IP, relatively small numbers of AA IP created, and little IP origination or ownership
- ◆ Funding access rating (5/10): Reasonable access to State-level assistance, but non-government funding is poor, and government assistance is very low
- ◆ Growth potential rating (5/10): Reasonable graduate levels, low salary levels but poor funding access and high developer mortality
- ◆ Overall competitiveness (4.25/10): A niche player likely to remain so.

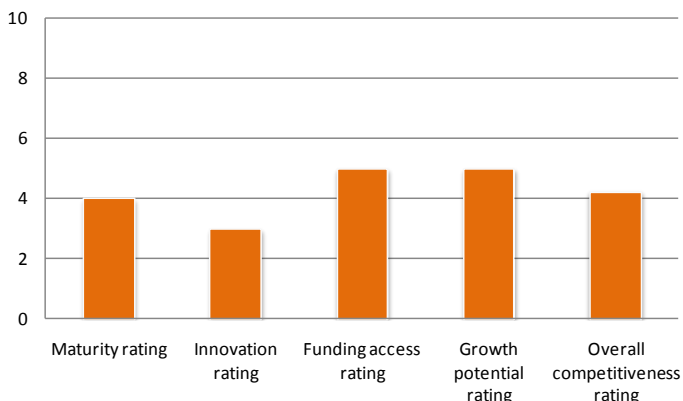


Figure 11. Performance ratings of Australia's games industry out of a score of 10

(UK Trade & Investment 2007)

The SWOT analysis of Australia's games industry from the same report identified key challenges faced by the industry (see Table 2). These challenges include the small size of the industry, staffing difficulties, low levels of access to non-government funding, low levels of IP generation, timeframe differences, geographical remoteness from the United Kingdom and Europe, reliance on overseas companies, and a contracting independent sector. However, the industry benefits from its low production costs, cultural proximity to major Western games markets, native English speakers, online gaming expertise, links being forged with Korea and China, good levels of state government assistance, games clusters co-located with other media, an increasing pool of local talent, and the existence of a few super-developers creating "pockets of excellence".

Table 2. SWOT analysis of Australia's games industry

Strengths
<ul style="list-style-type: none"> Relatively experienced if small kernel of development talent A couple of super-developers outscale most other companies Low costs vs. global competition plus native English speakers Online gaming specialty, with links being forged with Korea and China Good levels of State government assistance have protected the industry from industry down-cycle, nurturing several independents Games clusters are co-located with other media, facilitating crossover hits Staff levels growing healthily
Weaknesses
<ul style="list-style-type: none"> Small-scale market that has grown slowly Work for hire with low/no revenue sharing predominates Low levels of access to non-government funding Geographically remote from U.S. and Europe but no major links with neighbouring Japan Timeframe differences can be difficult Low levels of world-class IP generated to date Low level of domestic retail market leaves studios reliant on overseas companies A number of publishers in Australia operate only sales and marketing outfits, not studios Lack of experienced staff forces developers to recruit overseas - a difficult, lengthy and expensive process
Opportunities
<ul style="list-style-type: none"> Growing experience, low cost base and cultural proximity to major Western games markets sees the sector continue to grow healthily Rise in numbers of games-specific graduates maintains healthy flow of talent into industry Proximity to Korea and China sees Australian companies develop products for these growing markets A few super-developers create pockets of excellence, thus slowly spreading innovation, new IP creation and best practice
Threats
<ul style="list-style-type: none"> Stasis – the Australian industry simply tracks the growth of the industry as it enters the up-cycle of the next generation of consoles, but no faster Independent studios struggle to find financing and most growth is found in publisher-owned studios, leading to a further contraction of the independent sector and a reduction in Australia's ability to create and retain new IP Loss of senior non-Australian staff returning home

(UK Trade & Investment 2007)

Screen Australia's submission to the *Australian Government's 2010 Review of the Independent Screen Production Sector* stated that the "games sector is struggling to become sustainable" (p. 90) and faces two key challenges:

- ◆ Sustaining Australia's position as a preferred off-shore provider of production services to international games publishers
- ◆ Encouraging growth of 'Australia-made' games to ensure that a greater number of local developers retain intellectual property.

(Screen Australia 2010a, p. 68)

Two of the questions in the Worker Survey asked games employees to respond to questions about the performance of Australia's games industry. As shown in Table 3, almost 70% of respondents indicated they 'highly disagree' or 'disagree' with the statement, "Australia's digital games industry is growing rapidly"; and over 80% of participants indicated they 'highly disagree' or 'disagree' with the statement, "finding work in the industry is easy".

Table 3. Responses by employers to questions about the performance of the games industry

N=56	Australia's digital games industry is growing rapidly	Finding work in the industry is easy
Highly agree	0% (n=0)	1.8% (n=1)
Agree	8.9% (n=5)	3.6% (n=2)
Neutral	21.4% (n=12)	12.5% (n=7)
Disagree	33.9% (n=19)	50% (n=28)
Highly disagree	35.7% (n=20)	32.1% (n=18)

3.4 Chapter summary

This chapter focused on the evolution, characteristics and performance of Australia's digital games industry. Key findings are as follows:

- ◆ There were 45 games development business in Australia as at June 2007. These businesses mostly operated in Victoria, New South Wales and Queensland, and employed 1,431 workers. In 2006/2007, these businesses generated income of \$136.9 million (Australian Bureau of Statistics 2008).
- ◆ During the 30-year history of Australia's digital games industry, some Australian developers have achieved international critical and/or commercial success, and gained experience in developing and marketing products for the largest game publishers in the world (Australian Government Cultural Portal 2007).
- ◆ Competitive advantages for Australia's digital games industry include its low production costs, cultural proximity to major Western games markets, native English speakers, online gaming expertise, links being forged with Korea and China, good levels of State government assistance (mainly in Victoria and Queensland), games clusters co-located with other media, an increasing pool of local talent, and the existence of a few super-developers creating "pockets of excellence" (UK Trade & Investment 2007).
- ◆ Challenges contributing to Australia's digital games industry's reputation as a "niche player" include the small size of the industry, staffing difficulties, low levels of access to non-government funding, low levels of IP generation, timeframe differences, geographical remoteness from the United Kingdom and Europe, reliance on overseas companies, and a contracting independent sector (UK Trade & Investment 2007). These issues are contributing to the view that Australia's games industry is struggling to become sustainable.
- ◆ Despite higher revenue and consumer spending in the Australian video games industry as a whole, the Global Financial Crisis (GFC) has led to a downturn in the digital games industry in recent years. Major developers in Australia that have experienced job losses and/or business closures include Krome Studios, Transmission Games and Pandemic. Views expressed by some industry commentators as well as a significant number of employees who responded to this study's Worker Survey suggest that the industry will remain flat for some time. Yet some industry luminaries have a view that there is now a new, stronger industry with a focus on small teams and new platforms, whose investment potential is staggeringly bigger than that of its predecessor.

4. International games environment

This chapter of the report covers the international environment in which Australia's digital games industry operates, including emerging business models, revenue streams and lines of business. It also compares the performance of Australia's games industry against the performance of countries that have an established games industry. The next chapter (Chapter 5) draws together existing sources and data from this study to identify features, trends and issues related to the skilling of workers in Australia's games industry.

4.1 Global production cycle

According to the UK Department of Trade and Industry (2002), the digital games industry for console and stand-alone PC games consists of at least seven sub-sectors:

- ◆ Development
- ◆ Publishing
- ◆ Middleware and tools
- ◆ Outsourcing and service companies
- ◆ Format holders/console manufacturers
- ◆ Distributors
- ◆ Retailers

It is similar in structure to other creative and software industries such as film, music, computer software and books: intellectual property is created, published and distributed (Department of Trade and Industry 2002). The relative size of each of these subsectors varies across game development territories. Figure 12 on the next page shows the processes involved in games development as they relate to other processes.

Kerr (2006) identified four distinct content segments in the games industry: console, standard personal computer, massively multiplayer online games, and casual games. Each segment is structured differently, and companies within each segment have different production cultures and routes to market. These four segments network with a range of publishing, distribution, retail, middleware, and hardware companies.

Globally, the key trends in the games industry are towards greater concentration and conglomeration of publishing and distribution capabilities; increased licensing of intellectual property from real world and other media resources; and a decrease in the production of independent games (Kerr 2009, p. 9).

This observation is reinforced by an examination of the top selling console games in the UK and US markets during the past ten years. There is an increasing trend towards sequels, multi-platform licenses, and derivative game ideas. The structure of the games industry, while predicated on technical innovation, is arguably experiencing decreasing content innovation (Preston, Kerr & Cawley 2009). Whilst this trend persists, it could be argued that innovative design and development skills will have a lesser value than in a global games economy which encourages risk-taking with new gaming concepts.

There are important differences between the American, the European, and the Asian markets in terms of platform and content. These differences concern partly infrastructure, regulation, and payment systems in each country. More significantly, each market has a different affinity with particular game platforms, game genres, and character and game designs. As Preston et al. (2009, p. 1005) explained: "design, technology, and market skills and knowledge are mediated through relationships with global publishers and local innovation environments to crucially influence the innovation process".

4.2 Global software development

Global Software Development (GSD) is increasingly becoming the normal practice in the software industry and games development is no exception (Conchuir, Agerfalk, Olsson & Fitzgerald 2009). The most frequently cited reasons for shifting components of the production cycle offshore are:

- ◆ reduced development costs due to the salary savings
- ◆ reduced development duration due to greater time zone effectiveness as companies practice the so-called 'follow-the-sun' software development model
- ◆ closer proximity to markets and customers
- ◆ new opportunities for cross-site modularisation of development work, potential access to a larger and better-skilled developer pool, and the possibility of greater innovation, learning and transfer of best practices.

(Conchuir et al. 2009)

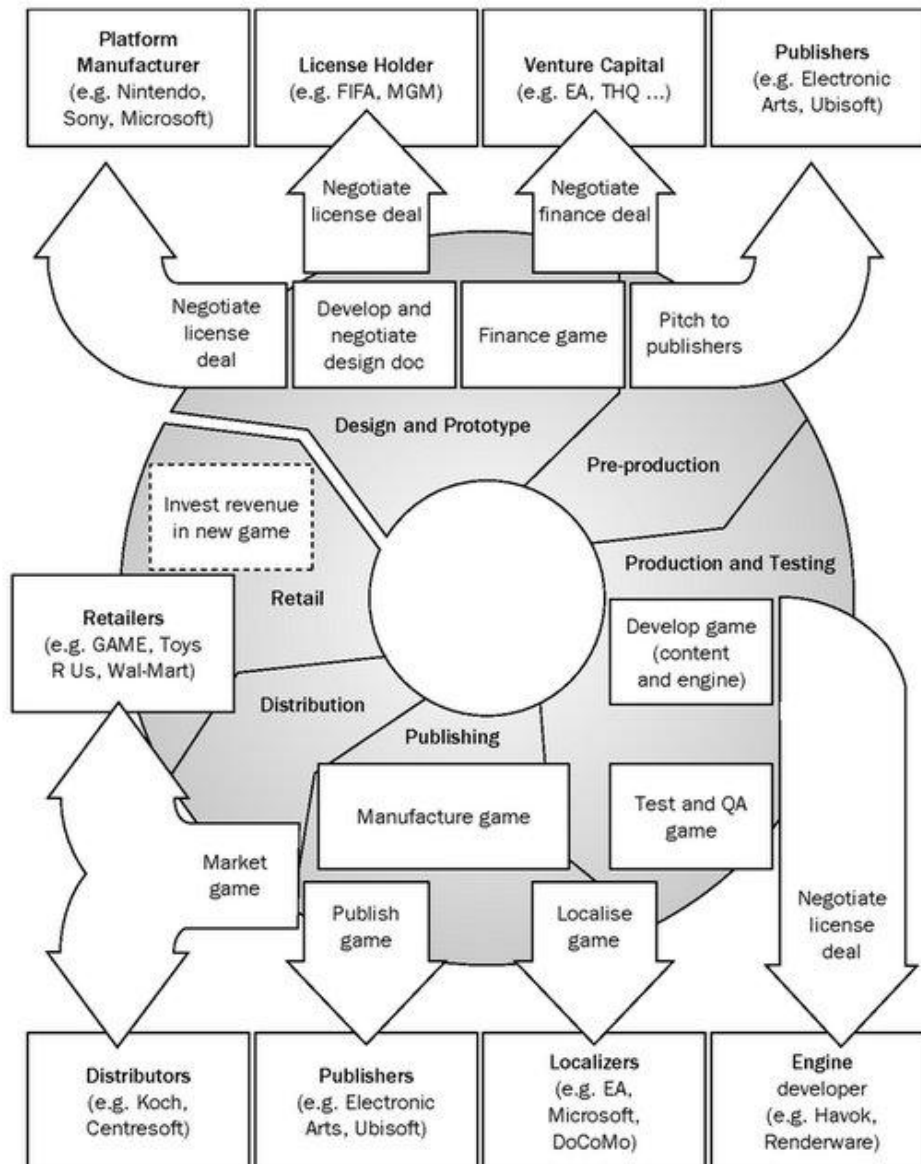


Figure 12. The Digital Game Production Life Cycle

(Kerr 2006, Figure 3.3, p. 86)

Evidence suggests the type of skills sought offshore by the major producers are primarily lower value-add, less complex and mission-critical tasks (Conchuir et al. 2009).

There are costs and benefits for Australia in selling skills to an international market. On the one hand, the talent pool available to Australian development companies shrinks. On the other hand, talented local designers and developers can access the financial resources necessary to nurture their work and possibly return later, better experienced, to local work. However, there are challenges inherent in GSD. Any software professional knows that even 'normal' – let alone 'global' – software development is fraught with difficulties (Carmel 1999). Workers in a global team have to manage geographical, temporal and socio-cultural distances. Unique skills are necessary to transcend these distances.

These skills are socio-political and cultural knowledge and sensitivity, emotional intelligence as well as excellent inter-personal communications. The Internet enables independent games producers to sell direct to consumers, bypassing the publishing oligopoly (Johns 2006). Johns (2006) explained that the Internet makes the greatest (initial) impact upon the production network in the distribution stage. The emergence of technologies enabling the informational content of games to be compressed into formats suitable for distribution over the Internet opened a potentially huge market for online distribution. In his examination of the impact of online distribution on the film industry, Currah (2003) observed that such technologies enable small producers to produce from further afield than is usual currently, thereby radically altering the geographies of production.

4.3 Global business models

There are many actual and potential business models for digital games, which are more or less appropriate for different products. The diffusion of broadband Internet access; increasing investment in R&D leading to advances in game features, infrastructure, hardware and software; and changing player demographics are driving the development of new business models (OECD 2005). The OECD (2005) expects "most computer game companies will have to rely on a mix of business models including advertising, premium services, and customer support services to increase revenue" (p. 29).

David Perry, game developer and consultant, devised a list of 29 business models. Examples of these models include: retail (selling boxed products at retail outlets), digital distribution, in-game advertising, around-game advertising, try before you buy/Trailware, subscription, microtransactions, velvet rope or members club, skills-based progressive jackpots, and pay per play/pay as you go/pay for time (Lightspeed 2008). **Appendix 3** includes a description of each business model.

The traditional models for console games and stand-alone PC games remain dominant, and are similar to those used in book publishing and independent film production. Developers produce a title on the basis of one or more of the following traditional models:

- ◆ *Fee-for-service contracts*: Under this model a global publisher might commission a game developer to develop a title against a licensed property, such as a film spinoff or licensed sporting event.
- ◆ *Self-funded titles*: are internally funded and then licensed to a publisher in return for royalty payments. Developers with a track record may secure distribution guarantees that can be used to securitise the completion of a title and ease the pressure on working capital.

(Cutler & Company 2002, pp. 18-19)

Newzoo (2010) also identified a range of business models and revenue streams for the game platforms of consoles, PC games, game portals, MMOs and mobile devices (see Table 4), including the increasingly popular subscription model and microtransactions model:

- ◆ *Flat-fee subscription model*: This model involves the player paying to play one or several titles online usually for a monthly fee. Blizzard Entertainment's World of Warcraft is the world's most-subscribed MMORPG, with over 11.5 million players and accounting for 62% of the MMORPG subscription market (Cavilli 2008; MMOGChart.com 2008). There are three subscription options: a month-to-month package at \$14.99 per month, a three-month plan at \$13.99 per month, and a six-month plan at \$12.99 per month (World of Warcraft 2010).
- ◆ *Microtransaction free-to-play (F2P) model*: This model involves players accessing the game for free but paying small fees each time they want character and gameplay enhancements, like a map or a weapon. South Korea's Wizet developed the popular free-to-play MMORPG, *MapleStory*, estimated to have over 100 million registered users worldwide. Players buy enhancements from the "Cash Shop" using real money (Wikipedia 2010).

Over 70% of developers who participated in the 2010 Game Industry Survey indicated the *microtransaction free-to-play* model as the most likely business model to gain ground, followed by the *digital download* (42.2% of developers) and *try-and-buy* (41%) models (Games Connection Research 2010, p. 15).

Cutler & Company (2002) indicated the challenge for title originators is keeping players deeply immersed in a game to ensure "a recurrent annuity of royalties derived from monthly subscriptions or 'membership fees', product placement charges, and merchandising opportunities" (p. 19). They argued that to do so title originators must commit to the on-going product development requirement of "customer care" and "creative moderation".

Table 4. Business models and revenue streams by game platform

Consoles	PC games	Game portals	MMOs	Mobile devices
<ul style="list-style-type: none"> ■ Physical shop ■ Online shop ■ Second-hand trade ■ Digital distribution 	<ul style="list-style-type: none"> ■ Physical shop ■ Online shop ■ Second-hand trade ■ Digital distribution 	<ul style="list-style-type: none"> ■ Subscriptions ■ Premium downloads ■ Virtual currency ■ Direct micro-transactions ■ Skill gaming / Play for prizes 	<ul style="list-style-type: none"> ■ Monthly subscriptions ■ Annual subscriptions ■ Virtual currency ■ Direct micro-transactions ■ Client download / box 	<ul style="list-style-type: none"> ■ Revenues are all game download revenues and not split up.
				

(Newzoo 2010, p. 2)

4.4 Country comparisons

Game Developer magazine publishes an annual ranking of the world's "Top 20" publishers. The ranking is based on a score calculated from each publisher's performance in the following five measures: annual turnover, number of releases, average review score, an anonymous reputation survey, and detailed anonymous feedback from those who have worked directly with the publisher. Between them, the "Top 20" publishers owned or controlled 190 game development studios as at June 2010.

Figure 13 shows the share of studio location by country. The United States accounts for the largest share of games studios in the world. Only 3% of all studios are located in Australia, and they include studios like THQ Studio Australia, Blue Tongue Entertainment, and 2K Australia. The location of game development studios (independent as well as publisher) is geographically portrayed in Figure 14. Studios are usually located in areas with adequate telecommunications infrastructure and political stability.

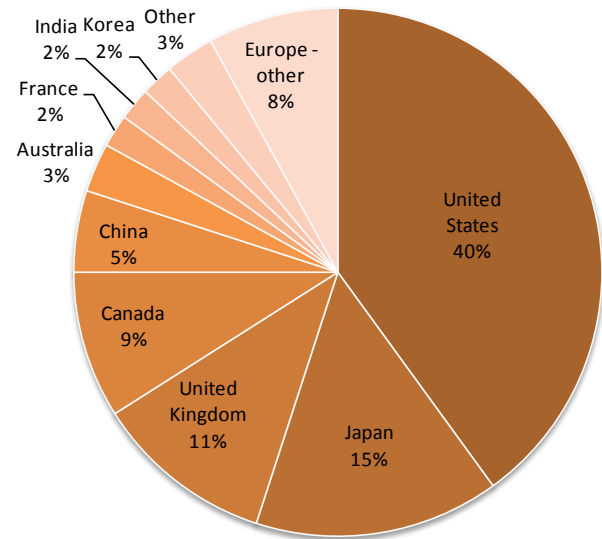


Figure 13. Location of the game development studios of the "top 20" publishers, June 2010

(Gamedevmap.com 2010)



Figure 14. Location of game development studios (independent and publisher) and clusters of studios, June 2010

(Gamedevmap.com 2010)

PricewaterhouseCoopers's *Global Entertainment & Media Outlook 2010-2014* report includes data on the global video games market by component, region, and country in the Asia Pacific region:

- Between 2005 and 2009, market shares of console games (62.6% to 55.3%) and PC games (15.3% to 7.5%) declined whereas market shares of online games (13.3% to 22.9%) and wireless games (8.8% to 14.4%) increased over this period. By 2014, online games and wireless games combined are predicted to have a bigger market share than consoles (Figure 15).
- Between 2005 and 2009, market shares of North America (30.6% to 28.8%) and Europe, Middle East and Africa (35.5% to 32.0%) declined whereas the market share of the Asian Pacific region has increased over this period (32.1% to 37.0%). This trend is predicted to continue (Figure 16).
- In the Asia Pacific region, Japan's market share declined significantly between 2005 and 2009 (51.1% to 37.9%) whereas China's market share increased significantly over this period (8% to 23.2%). By 2014, PricewaterhouseCoopers predicts that China will have the biggest share of the video games market in the Asia Pacific region (46.1%) while Japan's share will continue to decline (25.5%). Australia's market share is declining, falling from 6.5% in 2005 to 5.6% in 2009, and is predicted to decline further to 3.9% by 2014 (Figure 17).

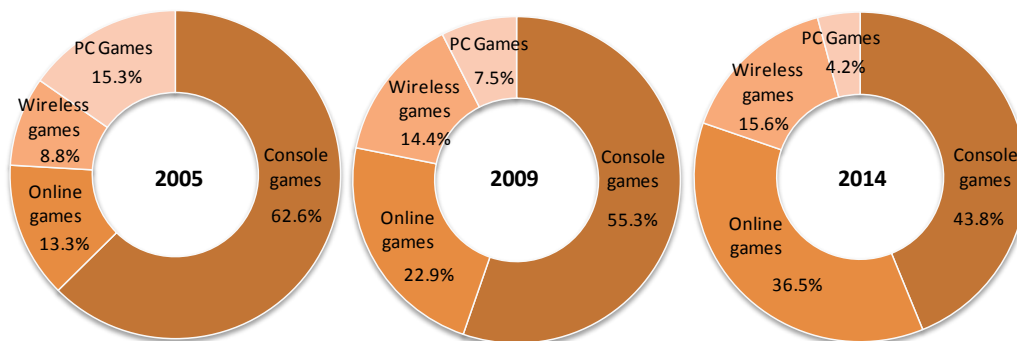


Figure 15. Global video games market share by component, 2005, 2009 and 2014

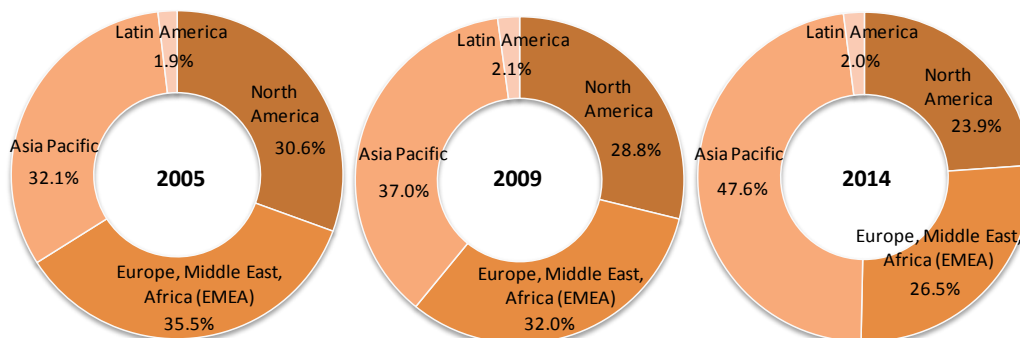


Figure 16. Global video games market share by region, 2005, 2009 and 2014

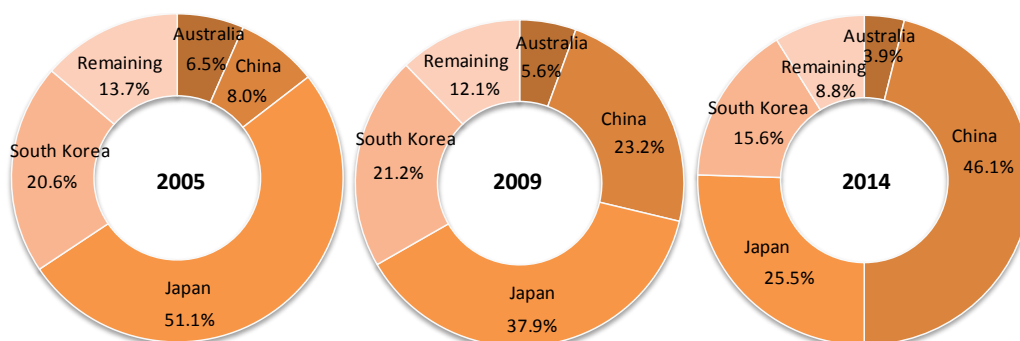


Figure 17. Global video games market share by countries in the Asia Pacific region, 2005, 2009 and 2014

(PricewaterhouseCoopers, 2010)

Although Australia is well regarded as having an industry with a low cost base, lower wages and conditions have contributed to a brain drain of Australian talent, particularly to the United States. A poll undertaken as part of this study confirmed this issue, with voters indicating that unattractive wages and conditions was the top weakness of Australia's games industry. As shown in Figure 18, salaries for junior artists, lead artists and lead programmers in Australia were well below salaries for these positions in Canada, France, United Kingdom, and United States in 2007. Australian salaries for junior programmers were slightly higher than salaries for junior programmers in the United Kingdom.

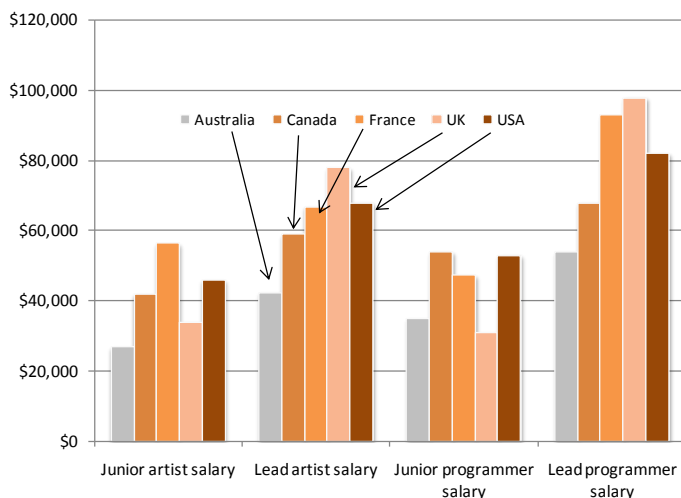


Figure 18. Salaries of games worker (US\$) by seniority and by country, 2007

(UK Trade & Investment 2007)

UK Trade & Investment's 2007 report, *Playing for Keeps: Challenges to sustaining a world-class UK games sector*, consists of profiles of games industries in Australia, Canada, France, Singapore, South Korea, United Kingdom, and the United States. To determine each country's relative ability to create games IP, UK Trade & Investment analysed findings from interviews and secondary research in the areas of the development and publishing markets; IP creation; funding environment, including public and non-government funding for the games industry; labour market; and analysis of each country's games development and publishing market, prospects and competitive positioning (p. 5). The analysis led to overall competitiveness ratings for each country (see Figure 19). Australia's games industry recorded the *second lowest* competitiveness rating out of seven countries, and the United States recorded the *highest* competitiveness rating. As stated in the previous chapter, the report indicated that Australia's games industry, with an overall competitiveness rating of 4.25/10, is likely to remain a niche player. Justifications for the overall competitiveness ratings for other countries are as follows:

- ◆ Canada (7.75/10): World-beating studios and large subsidies make this a very popular location for new publishers' studios.
- ◆ France (5.5/10): Great publishers, weaker developers, state aid in abundance but too inward focused in a global market.
- ◆ United Kingdom (7.5/10): Resting on laurels and facing stiff competition, but not under threat of extinction, some opportunities still exist, but IP creation is in decline.
- ◆ Singapore (3.25/10): Likely to remain little more than a hosting centre, bypassed en route to major Asian markets.
- ◆ South Korea (5.75/10): The market leader in Asia for online games, but few global games companies have/would be located there.
- ◆ United States (8.5/10): The place to be head-quartered but development is slowly moving outside USA.

See **Appendix 4** for justifications for the other ratings for each of the above countries i.e. maturity rating, innovation rating, funding access rating, and growth potential rating.

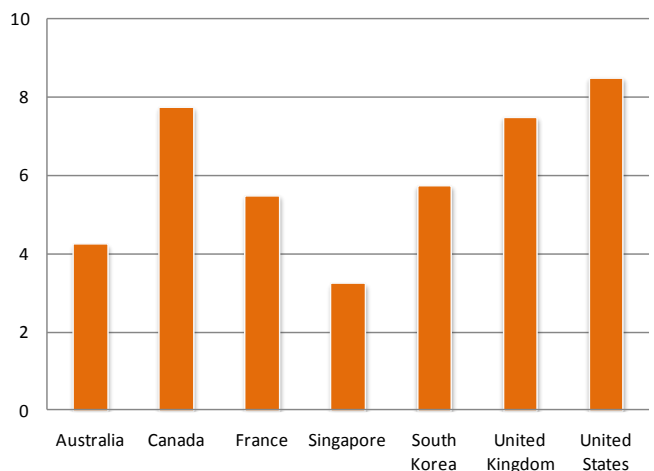


Figure 19. Overall competitiveness ratings by country, 2007
(UK Trade & Investment 2007)

UK Trade & Investment's 2007 report also included a SWOT analysis of the games industry for each country. See **Appendix 5** for full results for each country. Some of the strengths of the games industry in the three countries with the highest overall competitiveness ratings (Canada, United Kingdom, and United States) include:

- ◆ generation of IP, in particular world-class AAA IP across all genres
- ◆ being home to world's major publishing companies and leading developers (in Canada's case, close proximity to US publishers)

- ◆ a workforce of world-class creative and technical talent
- ◆ government funding and support in Canada and the United States
- ◆ a large retail market in the United States
- ◆ lower salary and overhead costs in Canada attracts US publishers
- ◆ cross-fertilisation from other world-class media industries (film & television production, music, publishing, internet) providing access to an excellent source of non-games IP
- ◆ ongoing technology innovation and, in the case of the United States, a smooth path between universities and commerce allows commercialisation of new technology.

4.5 Projected industry performance

PricewaterhouseCoopers in its *Global Entertainment & Media Outlook 2010-2014* report predicts a recovery in the global games market in 2010 and beyond. Due to stronger consumer demand, increased connectivity and the release of new games, they anticipate the global games market to:

- ◆ grow from US\$52.5 billion in 2009 to US\$86.8 billion in 2014
- ◆ achieve a compound growth rate of 10.5% in consumer spending, driven by growth in online, mobile and casual gaming
- ◆ become the second fastest-growing segment of entertainment and media behind internet advertising wired and mobile
- ◆ become the fastest-growing consumer/end user segment ahead of TV subscriptions and license fees.

Projections by DFC Intelligence in its 2010 *Worldwide Market Forecasts for the Video Game and Interactive Entertainment Industry* report are less optimistic. They predict the overall market will decline over the next few years before growing in the 2013 to 2015 period because the expected strong growth in PC and online platforms will be insufficient to offset the slowdown in console platforms from Microsoft, Nintendo and Sony (Research and Markets 2010).

PricewaterhouseCoopers (2010) identified the following key drivers of growth in the global games market:

- ◆ New games being marketed for the current generation of consoles (Wii, Xbox 360, PS3) and the latest handheld devices (Nintendo ds dual screen, PSP and PSP Go)
- ◆ Expansion of the online market due to the increase in penetration of broadband households combined with the growing digital distribution content

- ◆ The introduction of the next generation of consoles beginning in 2014, stimulating renewed growth in console games
- ◆ Increasing popularity of MMOGs, with their subscription fees and microtransactions
- ◆ Growth of casual games which are helping to expand the demographic base and stimulate spending
- ◆ Growth of smartphones with improved graphic capabilities, driving demand for wireless games
- ◆ New application stores making the purchasing of games more user-friendly
- ◆ Growth of 3G networks, with their faster speeds, providing an environment enabling wireless games to approach the quality of console games.

PricewaterhouseCoopers (2010) also identified increasing developer interest in **social gaming**, particularly given the success of *Farmville*, a Facebook farm simulation game with more than 100,000 million users playing the game every month (Gamasutra 2009). Riley (2010) found that:

- ◆ 20% of the US population aged 6 years and older (or 56.8 million people) had played a game on a social network in the past three months
- ◆ over one-third of these people were new to gaming
- ◆ although games are free, 10% of social network gamers had spent money playing these games and 11% indicated they would make a future purchase
- ◆ social network gamers were spending less on gaming overall since they started playing social network games.

The emergence of **cloud computing** which allows users to access online games without having to download them (thereby cutting down on piracy and allowing developers to update games easily) will also contribute to the overall growth in online games (PricewaterhouseCoopers 2010).

According to Games Connection Research (2009), the predicted strong growth in the global games market over the next five years has led to a feeling of "unbridled optimism" by games businesses that participated in its 2010 Game Industry Survey. The optimism is due largely to the predicted strong increase in revenues from digital distribution and massively multiplayer online games, new audiences (adults over the age 30 will account for a greater market share), new business models (particularly the free-to-play with microtransaction business model), and new lines of business (e.g. social network games, serious training games, advergames). The survey found iPhone, PS3 and 360 are likely to be the key platforms in 2010. Over half of games developers who participated in the

2010 Games Industry survey were interested in social games as a new line of business, and to a lesser extent, serious training games and advergames (Figure 20).

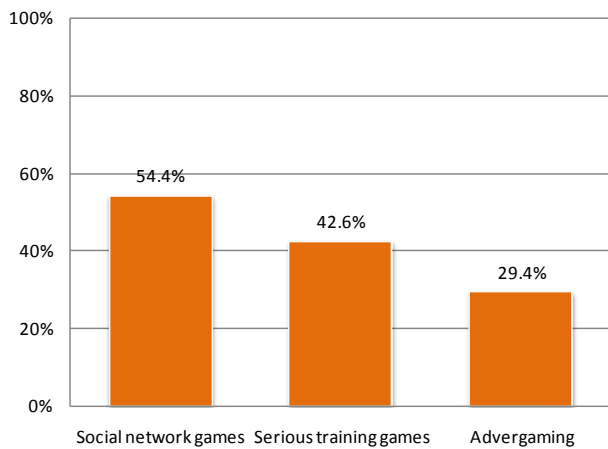


Figure 20. Developer interest in new lines of business, 2010 (Games Connection Research 2009)

Yet, games developers who participated in the global survey were less optimistic than publishers, retailers, and outsourcing and service providers about 2010 and less confident about their ability to face the evolution of the industry (Games Connection Research 2009). Just over 60% of developers indicated 2010 “would be a better year” compared to an average of 68.4% for developers, publishers, retailers and services combined; and 43.4% of developers indicated they were “ready to face the evolution of the industry” compared to 50.1% for developers, publishers, services, and retailers combined. Developers’ responses to their readiness for the future are worth noting:

- ◆ *We have to move to a digital distribution method as the traditional system is broken and un-sustainable in our view.*
- ◆ *We need to generate more revenue, and access to funding is extremely important but lacking in the current climate.*
- ◆ *We’ll continue to run projects following the classical scheme of financing/publishing while trying to broaden income from browser-based and free-to-play titles.*
- ◆ *The future is very positive, with lots of interest, but the economic climate today represents a serious challenge as budgets are squeezed and cash flow issues are challenging for both publishers and developers alike.*

The OECD in its 2005 report, *Digital Broadband Content: The online computer and video game industry*, identified barriers to the development of games industry that are still relevant today (pp. 45-46):

- ◆ **Connectivity:** Although broadband is diffusing rapidly, there are still countries with low penetration and coverage. Also low-speed Internet

and/or pay-per-megabit connections limit direct-download distribution models.

- ◆ **Legal framework:** Copyright and piracy issues that impact on innovation and innovation strategies and cash flow of firms must be addressed. Differences in cross-national legislation means firms have to deal with different legislative frameworks for copyright and media before they can enter or operate in different markets.
- ◆ **Micro-payment systems:** The absence of reliable widespread low cost micro-payment systems is a common problem for paying for access or download of small quantities of digital content. Other challenges are young players without credit cards, and where conventional payment systems are not well adapted to micro-payments.
- ◆ **Availability of skilled staff:** Industry may experience shortages of designers and programmers specialising in areas like game design and development; shortfalls in domestic supply; lack of educational courses and industry training; restrictions on immigration of highly skilled personnel; and difficulties in international sourcing of development tasks requiring large amounts of interaction among teams of developers. These factors can lead to delays in software and applications development, difficulties for small innovative businesses outside major industry centres, or relocation of activities to other countries. Demand for highly specialised skills is expected to intensify as the complexity of games grows and if the life cycle of game generations shortens and requires more sophisticated design capabilities.
- ◆ **Female employees:** The share of female employees in the industry is relatively low, and most of those who do work in the industry are involved in administrative, marketing or managerial occupations. The low level of female participation in the industry may be a barrier to providing a broader focus on female concepts and content.
- ◆ **Management and organisation:** Management skills, organisation and information flows have been seen as impediments to growth. The industry is fragmented in many countries with separation between different parts of the software development and hardware and infrastructure parts of the value chain.
- ◆ **Financing issues:** The intangible nature of the product (games software and graphics) means that the usual financial institutions may not wish to finance development. The structure of the industry means games publishers and games portals may wish to have partly or fully developed products before signing contracts with developers, which places the financial burden on small firms with only one or a few products and a short track record.

These challenges are even more acute for firms attempting to enter international markets.

NESTA (2008) identified similar barriers to the OECD, referred to as structural weaknesses, which are also applicable to Australia's games industry. These weaknesses are unsustainable business models and barriers to finances; limited knowledge transfer with other creative sub-sectors; and lack of generous public support for games development, diverting resources and talent away to countries that provide industry with support e.g. France, Singapore, some US states.

4.6 Chapter summary

This chapter focussed on the international environment in which Australia's games industry operates. Key findings are as follows:

- ◆ The games industry is experiencing a) a greater concentration and conglomeration of publishing and distribution capabilities; b) increased licensing of intellectual property from real world and other media resources; c) a decrease in the production of independent games; and d) an increasing trend towards sequels, multi-platform licenses, and derivative game ideas (Kerr & Cawley 2009).
- ◆ There are differences in the American, the European, and the Asian markets in terms of preferred platforms and content, infrastructure, regulations, and payment systems (Preston et al. 2009).
- ◆ Global Software Development (GSD) is on the rise due to a) reduced development costs due to salary savings; b) reduced development duration; c) closer proximity to markets and customers; and d) new opportunities e.g. potential access to a larger and better-skilled developer pool (Conchuir et al. 2009).
- ◆ The diffusion of broadband Internet access; increasing investment in R&D leading to advances in game features, infrastructure, hardware and software; and changing player demographics are leading to new business models (OECD 2005). Although the traditional models for console games and stand-alone PC games remain dominant, subscriptions and microtransactions are rapidly increasing in popularity.
- ◆ The United States accounts for the largest share of games studios in the world (Gamedevmap.com 2010). Only 3% of all studios are located in Australia. The regions of North America and Europe, Middle East and Africa are losing market share of the global video games market whereas the Asia Pacific region is gaining market share. In the Asia Pacific region, Japan is losing market share whereas China is significantly increasing market share and is likely to surpass Japan's market share by 2014. Australia's market share is declining (PricewaterhouseCoopers 2010).
- ◆ For most positions, salaries for games workers in Australia are well below salaries for games workers in Canada, France, United Kingdom, and United States (UK Trade & Investment 2007).
- ◆ Australia's games industry recorded the second lowest competitiveness rating out of seven countries, and the United States recorded the highest competitiveness rating, followed by Canada and the United Kingdom (UK Trade & Investment 2007). Strengths of countries with high competitiveness ratings include a) generation of world-class AAA IP; b) being home to the world's major publishing companies and leading developers; c) a workforce of world-class creative and technical talent; d) government funding and support; e) large retail markets; f) cross-fertilisation from other world-class media industries; g) ongoing technology innovation; and h) a smooth path between universities and commerce that allows commercialisation of new technology.
- ◆ The global video games market is expected to grow from US\$52.5 billion in 2009 to US\$86.8 billion in 2014, driven by a) new games for the current generation of consoles; b) expansion of the online market; c) introduction of next generation of consoles; d) increasing popularity of massive multiplayer online games (MMOGs) with subscription fees and microtransactions; e) growth of casual games, helping to expand the demographic base and stimulate spending; f) growth of smartphones with improved graphic capabilities, stimulating demand for wireless games; g) new application stores making the purchasing of games more user-friendly; and h) growth of 3G networks with their faster speeds, enabling wireless games to approach the quality of console games (PricewaterhouseCoopers 2010).
- ◆ Issues related to connectivity, legal frameworks, micro-payment systems, availability of skilled female employees, management and organisation, financing issues, lack of public support, and limited knowledge transfer with other creative sub-sectors are barriers to industry growth (OECD 2005; NESTA 2008).
- ◆ When surveyed in 2009, games businesses around the world had "unbridled optimism" about 2010 due to the predicted strong increase in revenues from digital distribution and MMOs, new business models, new audiences, and new lines of business. However, games developers were less optimistic than publishers, retailers, and outsourcing and service providers about 2010 and less confident about their ability to face the evolution of the industry (Games Connection Research 2009).

5. Skilling of digital games workers

This chapter of the report presents key findings from existing Australian reports that provide insights into the skilling of workers in Australia's digital games industry. It then describes government support for Australia's games industry; games education and training provision in Australia; skills standards and competencies; and issues related to the education and training of games workers as well as proposed solutions to address these issues. The chapter also compares skill requirements and industry-university linkages in Australia with those in selected countries. The concluding chapter (Chapter 6) draws together findings from the consolidation study, discusses areas that stakeholders could investigate further, and explains the process to complete the second report for this study, *Future Skills Strategy for Australia's Digital Games Industry*.

- ◆ *Digital Content Industry Roadmapping Study* (2005)
- ◆ *Analysis of skills and training issues affecting the digital content industry* (2005)
- ◆ *Unlocking the Potential: Digital content industry action agenda* (2005)
- ◆ *Digital Content Industry: Discussion Paper* (2006)
- ◆ *Review of the Digital Games Development: Game Art, Animation and Programming* (2009)

The focus of most reports has been on the demand side of the skills equation with less emphasis on the supply solutions, with some attention to how the supply and demand sides can productively interact. Each report cites findings from preceding reports and usually represent an advance or progression in responding to skills issues in Australia's digital games industry.

5.1 Existing Australian reports relevant to the skilling of games workers

The key Australian reports produced over the last decade echo the same sentiments about Australia's games industry workforce, some of which UK Trade and Investment (2007) expressed in its statement in the below box. The reports discussed in this chapter are:

- ◆ *Victoria's Game Plan* (2000), which was followed by *Game Plan: the Next Level* in November 2001, and *Game Plan: Game On* in February 2003
- ◆ *Producing Digital Content* (2002)
- ◆ *From reel to unreal: Inquiry into the future opportunities for Australia's film, animation, special effects and electronic games industries* (2004)

The Victorian Government produced Australia's first digital games policy document in 2000. **Game Plan** was followed by **Game Plan: the Next Level** in November 2001 and **Game Plan: Game On** in February 2003 (Multimedia Victoria 2003). The policies articulated in these documents led to a number of actions focussed on developing skills of Victorian games workers:

- ◆ Networking between industry and education sectors to develop curriculum
- ◆ Promoting careers in computer game development to Victorian secondary students
- ◆ Working closely with both the Australian Centre for the Moving Image and the State Library of Victoria
- ◆ Professional development for ICT teachers.

An internationally-scoped research report prepared by which UK Trade and Investment (2007, p. 12) for the UK Government described Australia's games industry as very small, dependent on attracting overseas skills and on local staff gaining skills overseas.

Australia's digital games development workforce after 25 years numbers roughly 1,000 employees. Due to a lack of high quality experienced indigenous development staff, many larger developers have to recruit from overseas, making it an expensive (e.g. interviews and relocation costs) and difficult process. As we have seen, many staff learn their trade overseas. The size of the sector means that the kernel of experienced developers disseminates its knowledge slowly through the industry, the few games-focused business angels reinvest in start-ups very rarely, and the track record of major titles that the 60 studios output grows only slowly. Stimulating the sector via grants and other forms of government funding, encouraging linkages between universities and studios, and endeavouring to attract skills to Australia's shores are viable strategies for tackling this problem, which are arguably bearing some fruit, but the challenge for a tiny sector in a country of 20 million people is inherently long term in nature. A disproportionately high number of the Australian development industry's more experienced staff and senior management are non-Australian nationals, particularly UK and USA nationals. The potential impact of the loss of these staff is elevated as a result. Staff replacement times are high due to relative geographic isolation.

In 2002, the Australian Department of Communications, Information Technology and the Arts commissioned Cutler & Company to prepare the report, ***Producing Digital Content***. In the chapter on human capital for electronic games, they described the skills needs of the industry as follows:

Successful game developer companies need to be able to attract, retain, and manage complex people teams. The following list summarises the actual skills profile of a major game developer: 30 artists, 28 programmers, 5 designers, 2 producers, and 12 system developers.

Game developers need people who can write lean code, and can develop titles in real time - and on time and on budget. There is a premium for project management skills.

There is an observable difference between the career paths and skills of the entrepreneurs founding and growing enterprises in the games market, and the profile of specialist workers within the industry. Enterprise entrepreneurs in the industry are characterised by some eclectic mix of publishing passion, entrepreneurial flair and a commercial incentive to try and recoup a return on the investment of their sweat equity. The industry leadership group represented by the members of the Game Developers Association are quintessential information economy entrepreneurs.

The employee labour force is very different. As in film and television, the games labour force is motivated by the buzz of the current project, the attractiveness of being part of a specific team environment, and the ability to recoup intrinsic creative rewards.

The growing availability of specialist vocational training is creating entry options into this industry, such as the tertiary programmes in 3D animation, real time production, and interactive script development. It is noteworthy that students graduating from traditional film and television programmes now see games development as a new and attractive career option. One interviewee commented on the high proportion of script writing graduates who now go straight into the games industry.

There are strong informal networks between workers in the games industry, reflected in email lists and regular pub nights. There is evidence that a sense of membership of a community matters. This has implications for consideration of industry clustering.

(Cutler & Company 2002, pp. 23-24)

The distinction between the attributes of entrepreneurs creating game development companies and the employees of those companies is not made in other reports. Many histories of the games industry tell the stories of successful games industry entrepreneurs who started out as games designers or developers (for example, Australian Centre for the Moving Image 2008a; 2008b). Other reports cite the value of technicians who demonstrate entrepreneurial skills and business leaders who have a technical background (for example, Aasheim, Li & Williams 2009).

The report for the House of Representatives Standing Committee on Communications, Information Technology, and the Arts, ***From reel to unreal: Inquiry into the future opportunities for Australia's film, animation, special effects and electronic games industries*** (2004), examined the film, animation, special effects and electronic games industries. It received a large number of submissions from all segments of the digital content industry. Those making submissions included companies, industry associations, education and training providers, and government agencies. The terms of reference for the inquiry included the direction to report on "the skills required to facilitate future growth in these industries and the capacity of the education and training system to meet these demands" (p. xi).

The report found that most skills needed in each of the digital content industry segments were transferable across segments, and that the potential for transference is likely to increase as these segments further converge (p. xxix). Limits to convergence were noted:

The commercial realities of games and films are quite different and, therefore, there are likely to be limits to convergence. As The Economist noted: ... the main trend will continue to be to make games from films, not vice versa. Indeed ... publishers are starting to think twice about selling the rights to their games, since a bad film adaptation – over which the game publisher has little control – can tarnish a lucrative game franchise. There could turn out to be limits to the cosiness between the two industries after all. (p. 147)

To whatever extent it proves feasible, enactment of converging technologies needs specific skills and this was a theme of the Government funded IT training think tank, IT Skills Hub, in their submission:

... currently there are very few people who have capability to author interactive content or to develop new iTV applications. There is no formal education and training in the disciplines necessary for the integration of content production, software, telecommunications and applications development. A critical priority for Australia is the development of formal education and training in this field and the support and resourcing of organisations to provide such education and training. (p. 120)

The commitment of IT Skills Hub to convergence is perhaps ironically reflected in their closure in 2005 as part of an effort "to consolidate resources and reduce fragmentation of ICT industry representation across a number of associations" (public statement by IT Skills Hub CEO Brian Donovan published online at itwire.com on 15 May 2005).

The inadequacy of existing training and education programs to meet the needs of industry was a recurring theme. The failure of training providers to develop content in consultation with industry was identified as causal. Robert Walsh, CEO of Krome Studios made the point well:

Being really honest, I am the largest employer in Australia and I have no interaction with any of the government institutions when it comes to training and education. Not one of them comes and knocks on my door and asks me what I want. (p. 23)

Table 5 summarises skill gaps, training system issues, and recommended approaches relevant to the digital games industry that were identified in the submissions. It has been derived from an examination of the tabled report and relevant individual submissions. A key feature is the similarity of issues raised across each of the industry segments, and similarity of approaches recommended to address these issues.

The report made 42 recommendations, four of which were specifically concerned with skills.

- ◆ **Recommendation 17:** The Committee recommends that CREATE Australia and its expected successor, the Business and Innovation Industry Skill Council, increase communication between industry and training providers and accreditation bodies to reduce skill gaps through the following process:
 - A roundtable to establish informal links
 - Regular surveys to establish a database whereby industry specifies projected needs and providers specify projected facilities and programs.
- ◆ **Recommendation 18:** The Committee recommends that the Australian Government, in cooperation with State and Territory Governments, adapt apprenticeship and on-the-job training programs to take into account the particular needs of Australia's film, animation, special effects and electronic games industries. Because of the nature of these industries, it seems likely that the establishment of group training companies will assist. Additionally, the ABC and SBS can be expected to be actively involved in these programs.
- ◆ **Recommendation 19:** The Committee recommends that the Australian Government work with national and State accreditation bodies to decrease red tape and time in accrediting courses relevant to the industries examined in this inquiry and publish performance information on the timeliness of accrediting these courses.
- ◆ **Recommendation 20:** The Committee recommends that, in line with recommendation 28 of *Learning to Work*, the report of the House of Representatives Standing Committee on Education and Training, the Australian National Training Authority (ANTA) receive additional funding to facilitate the development of qualifications and industry links in the new and emerging industries examined in this inquiry.

Table 5. Findings relevant to the games industry from the 2005 Committee of Inquiry into the future opportunities for Australia's film, animation, special effects and electronic games industries

Issue	Recommended approach
▪ Rapidly expanding industry facing skill gaps and needing rapid response	<ul style="list-style-type: none"> ▪ Courses need to better reflect industry needs ▪ Course accreditation process needs to be streamlined so as speed-up development and review cycles
▪ Existing employees and new recruits need to be up-skilled	<ul style="list-style-type: none"> ▪ Stronger interaction between education providers and industry
▪ Lack of local experience and skills necessitates expensive and time-consuming overseas recruitment	<ul style="list-style-type: none"> ▪ Industry has taken initiative to respond but needs support
▪ Graduates are not work-ready	<ul style="list-style-type: none"> ▪ Need to have major review of content of courses
▪ Courses do not cover generic skills such as time management, project management, and team work	<ul style="list-style-type: none"> ▪ Teachers need to have had industry experience ▪ Courses may need to be longer to include necessary content ▪ Students need to learn skills within the context of an operating business
▪ Capacity to excel while working in inter-disciplinary teams is needed	<ul style="list-style-type: none"> ▪ Skills to work in teams combining technical, creative and business management need to be taught
▪ Shortage of opportunities for structured on-the-job training such as traineeships and internships	<ul style="list-style-type: none"> ▪ Expand number of available places ▪ Provide funding and incentives to support business to take on interns and trainees
▪ An apprentice-style model may be useful for some jobs	<ul style="list-style-type: none"> ▪ Trial an apprentice-style model

The status of the Government's response to the report was cited on 21 June 2007 as "The government response will be finalised in the light of the outcomes of the Review of the Australian Government Film Funding Support" (Parliament of Australia, Hansard). The next tabled status on 25 June 2009 was given as the "Speaker wrote to the committee and the committee informed no further response required" (Parliament of Australia, Hansard).

The Australian Interactive Media Industry Association (2005) commissioned the **Digital Content Industry Roadmapping Study** to examine the creation, development and commercialisation of intellectual property (IP) in digital media, including games. It was commissioned as part of the Government's *Digital Content Industry Action Agenda* and provided information for the **Unlocking the Potential** report. The Roadmapping Study added to the body of knowledge about skills issues in the digital games industry to the extent of quantifying the issue and adding detail to the known profile of the industry.

Key skill-related findings from the study are as follows:

- ◆ *Creative skills are the hardest to find – and easiest to lose.* Overall, a quarter of the industry indicated difficulties recruiting staff, rising towards a third amongst the larger entities and those producing software. Those who experienced difficulty found creative skills and then management skills the most difficult to find. Almost half of all companies indicating difficulties nominated design/creative as the hardest to source, compared to 37% who cited management skills. Companies said the danger of losing design and creative staff to overseas firms was very real, particularly in the computer games, animation and visual effects sectors (p. 5).
- ◆ University and TAFE graduates were not considered “job ready”. Universities and TAFE institutions in particular, were not considered to produce students with sound technical, creative, business or team skills. Companies reported that graduates tended to over-estimate their own capabilities and had not been adequately prepared for the fact that technicians needed more than software competence to be effective team members. Graduates rarely had the requisite project skills, such as deadline sensitivity (p. 6).
- ◆ Experienced technicians are difficult to find. A number of companies indicated they had turned to importing international skills on a contract basis. This was particularly true for projects that required either rapid up scaling, or required highly specialist skills (p. 6).

The Australian Department of Communications Information Technology and the Arts (DCITA) commissioned Buchan Consulting (2005) to prepare the report, **Analysis of skills and training issues affecting the digital content industry**, as part of the *Digital Content Industry Action Agenda* and to inform its *Unlocking the Potential* report.

In order to prepare their report, Buchan Consulting analysed the submissions made by companies and associations to the earlier Parliamentary Review *From Reel to Unreal*, and conducted interviews. They identified skills gaps within the games industry “across a spectrum of design, programming and producer categories” (Buchan Consulting 2005, p. 40).

Recognising the limited utility of such broadly scoped skills sets, they then commented: “a full definition of occupations in shortage and skills gaps would require a wide ranging survey [...]. This was beyond the scope of this study. A structured program of industry research is a major recommendation of this report” (p. 40). They went on to say: “Games is an emerging sector that is experiencing strong global growth. As games become more sophisticated larger teams (and budgets) and a broader range of skills are required. The industry is currently reporting global skills shortages”. (p. 43)

A group of senior industry leaders appointed by Government (the Strategic Industry Leaders Group or SILG) prepared the **Unlocking the Potential: Digital content industry action agenda** report (DCITA 2005). Members of the SILG were drawn from across the spectrum of digital content creators, developers and publishers. The SILG consulted with almost 50 key industry organisations and other stakeholders. While this report did not devote specific attention to the digital games sector of the digital content industries, games were frequently cited to illustrate particular points throughout the report. This is in contrast to other digital content reports which maintained an almost exclusively generic focus. The key issues identified in the report reiterate those documented in preceding reports:

Despite a large supply of skilled graduates from over 320 university and vocational education training courses, the expected 20,000 graduates are not industry ready. Industry is trying to fill the gap, but without an overall framework for accreditation or support that sufficiently recognises industry based training. The government attaches high priority to addressing chronic skills shortages because of their threat to productivity and economic growth. In the context of a rapidly growing industry, which is important to the productivity of many other industries, the issue of skills and training is even more acute. (p. 10)

The report made a number of key recommendations covering what were described as ‘the four essential areas’ of which skills and training was one. In relation to skills and training, the group recommended:

- ◆ achieving greater recognition of, and much faster accreditation for, industry-based training activity
- ◆ demonstrating and promoting the feasibility of successful industry-based training models or exemplars to the Digital Content Industry, education and government for use nationally and to support employer involvement
- ◆ improving linkages between industry, education, TAFE institutions, universities, Innovation & Business Skills Australia (IBSA) and training providers, commencing with a roundtable discussion on industry-based training models.

(DCITA 2005, p. 13)

Specifically, the report claims that universities, TAFE institutions and private training providers are “not targeting skills gaps within the industry, particularly to meet future growth markets in eLearning, architecture, planning, health, mobile content and games despite enrolments” (p. xx).

The report also found that businesses are forced to do too much of its own training:

Many Digital Content Industry organisations are required to maintain internal training structures to ensure graduates and employees contribute the competitive skills sets required, such as sound technical, creative, marketing, business/team and project management skills. As software products change approximately every nine months, industries are seeking the necessary technical and creative skills sets, as well as essential problem solving skills and the ability to adapt quickly to the dynamic technology. (p. 27)

Other jurisdictions (e.g. the United Kingdom) claim that many of these skills are not trainable outside the workplace, or what has been labelled “skills” are actually personal attributes (e.g. creativity, flexibility, resourcefulness).

Arguably, the reports to date added little to what was known in 2000 and 2002 with the publication of the Victorian Games series of reports. The **Digital Content Industry: Options for national vocational qualifications. Discussion Paper** (Innovation & Business Skills Australia 2006) changed that by proposing a training framework within which digital content skills could be conceptualised and taught. However, the change was limited to training delivered by the vocational training sector and had no implications for the university sector.

The discussion paper acknowledged that some education and training providers had developed accredited courses and written additional units of competency to cover gaps in the existing training package structure. It was proposed that, where possible and desirable, these units be incorporated into the revised qualifications. The games-specific section of the discussion paper is reproduced in the box on the right.

Following circulation of the discussion paper and consultation, the multimedia qualifications and units of competency in the *Film, Television, Radio and Multimedia Training Package* (CUF01) were replaced with the *Screen and Media Training Package* (CUF07) in January 2008 (and revised in November 2009) (National Training Information Service 2010a). The new title 'Screen and Media' is said to reflect industry convergence arising from new production techniques in the digital age. The industry coverage remains the same as for CUF01; namely creative, management, administration and technical production roles in the screen and media industries, which encompass:

The way in which Interactive Digital Media deals with Games is relatively complex. There are two sectors in the electronic games industry – those developers who are providing low level (Flash, Director based) Internet and CD-ROM games, and those studios (the large commercial enterprises) providing video games for Sony Playstation 2, Nintendo, Xbox and mobile devices such as mobile phones, PDAs, Sony PSP, Gamecube, Nintendo DS and so on.

In the former case, skills and knowledge in a Diploma and Advanced Diploma of Interactive Digital Media should be sufficient for design, graphic art and basic authoring (Flash, Director). Units in CUF01 on games principles and designing multimedia products should suffice for low level games, and the use of game principles in the development of interactive applications such as e-learning. For more complex systems, stills running off PC or Internet, the Diploma of Information Technology (Software Development) ICA50705 should suffice.

It is the second sector of video and mobile games where the skill demands are much greater. This sector of the games industry has traditionally recruited programmers from university Computer Science and/or Computer Engineering courses and private providers. Educational institutions believe they could target courses better if they had more direct access to developer kits from multinational corporations such as Sony and Microsoft. The video games sector recruits graphic artists from a wide background, including non-digital artists. They are wary of 'multimedia' graduates because they feel these graduates have no appreciation of games technology and programming constraints. Opportunities for work as games designers tend to arise only after having many years experience in the industry – usually 10 years or more. Sometimes people in these positions come from film and television backgrounds.

(Innovation & Business Skills Australia 2006, p. 20)

- ◆ film production (primary release through cinemas)
- ◆ television production
- ◆ radio broadcasting
- ◆ interactive digital media (e.g. electronic games, websites, educational resources).

The *Screen and Media Training Package* also sees better integration with other qualifications under IBSA's coverage. For example, skills sets have been introduced which provide pathways into the *Diploma of Screen and Media* as well as into qualifications in the *Business Services Training Package* (BSB07).

Innovation & Business Skills Australia released its report, **Review of the Digital Games Development: Game Art, Animation and Programming**, in December 2009. The report aims to “inform any decision on how best to provide business and workers in this sector with the skills required to succeed today and in the future” (p. 1). It proposed five recommendations to guide “the future development of qualifications, skills sets and units of competencies for digital games development and the

related areas of game art, animation and programming” (p. 5); and to meet demand by employers for graduates with “hard-edge skills” who can “deploy improved ways to produce games that keep pace with constantly changing platforms and consumer preferences” (p. 2). The recommendations listed on page four of the report are as follows:

- ◆ **Recommendation 1:** The current national qualifications in IBSA Training Packages do not satisfy current or future needs of the digital games development, 3D digital art, animation, or game programming needs. To give better coverage it is recommended a Diploma in Digital Games Development and Interactive Applications be developed. This may be complimented by a Certificate IV that is either a standalone qualification or an exit point within the Diploma.
- ◆ **Recommendation 2:** New units of competency should be written to enhance coverage of skills and knowledge required in the areas of digital content creation, games development, 3D and digital art, animation, and virtualisation.
- ◆ **Recommendation 3:** Career pathways should be promoted that are broader than the games development sector by ensuring qualifications provide core competencies and elective streams allowing specialisation in vocational pathways that already exist or are emerging.
- ◆ **Recommendation 4:** Entry level qualifications in the Screen and Media Training Package (CUF07) and Information and Communications Technology Training Package (ICA05) should be enhanced to better promote not just the foundation or essential skills in new media and digital content creation, but to promote articulation of graduates from these qualifications into further learning and work relating to the digital games development and 3D and interactive media vocational outcomes.
- ◆ **Recommendation 5:** The skills sets identified as relating to games development, game art, animation and programming should be embedded within the proposed qualifications and endorsed as part of a national Training Package.

The report also proposed a draft *Digital Games Development Competency Framework* (see Oon the next page) to show the vocational domains (central circle) and related vocational roles (outer ring) that qualifications should cover. Report recommendations and the framework structure considered demand for the competencies and qualifications, current skills shortages, and emerging vocational activities:

- ◆ **Competencies and qualifications:** Demand for foundation/essential skills in new media and digital content creation; and programming and 3D rendering skills in emerging activities (p. 18)

- ◆ **Skills shortages:** Games software and application programmers (especially C++), interactive media specialists, games database developers and administrators, 3D renderers/technicians, and business managers (p. 21)
- ◆ **Emerging vocational activities:** Simulations, special effects, 3D and virtualisation, 3D digital art and rendering, interactive multimedia, mobile games and applications, mental fitness and applications, mental fitness and business tools, and virtual and online games (p. 12).

Arguably, the reports to date may have added little to what was known in 2000 with the publication of the Victorian Games series of reports. The industry continues to face the following key skills issues, some of which may be due to infrastructure or systemic anomalies in existence at the time of the reports:

- ◆ Rapidly expanding industry (until recently) facing ongoing skills shortages and gaps
- ◆ Insufficient/ineffective linkages between industry and education and training providers
- ◆ Rapid pace of change in the industry means workers need access to ongoing education and training
- ◆ Lack of local experience and skills necessitates expensive and time-consuming overseas recruitment
- ◆ The mismatch of graduate skills and industry needs indicated by graduates who are not work-ready and lack generic skills such as time management, project management, and team work
- ◆ Critical importance of certain non-technical skills
- ◆ Teachers with insufficient industry experience
- ◆ Shortages of structured on-the-job training such as apprenticeships, traineeships and internships, exacerbated by a lack of funding and incentives to support business to offer on-the-job training.

5.2 Government support for Australia's digital games industry

The Australian and State Governments have attempted to address some of the above issues.

In response to concerns about the quality and relevance of education and training for the games industry, existing VET training packages have been overhauled and new VET training package for Screen and Media released, which includes specific games design and development components. Recommendations in Innovation & Business Skills Australia's 2009 report, *Review of the Digital Games Development: Game Art, Animation and Programming*, aim to inform the development of qualifications that improve the employability of graduates and better meet the skills needs of employers.



Figure 21. Digital Games Development Competency Framework

Source: IBSA 2009, p. 3

In February 2009, the Australian Government launched the \$17 million Creative Industries Innovation Centre (CIIC) to provide services for creative practitioners and businesses of all sizes. Its education and training service assists businesses, including games businesses, which are finding it “difficult to recruit and retain talented staff” by “working with industry and universities to develop training opportunities and guidelines for professional practitioners and business managers” such as:

- ◆ undergraduate ‘enterprise learning’ and internship opportunities
- ◆ skills development, leadership master and entrepreneurial business training
- ◆ postgraduate commercialisation and know-how
- ◆ training and education for specific creative sectors.

(Enterprise Connect 2009)

The Australian Government also funds Screen Australia to provide programs games developers can apply for:

- ◆ *Serious Games Initiative*: This joint initiative of Screen Australia and ABC Television funds three teams to attend a workshop to develop their serious game idea, with the assistance of international and local mentors, and then funds one of these teams to produce their game (Serious Games Initiative 2010).

- ◆ *Innovation Program*: This program funds the development and/or production of innovative, dynamic multi-platform and single-platform interactive media of any duration, format, or type, including, but not limited to, content-rich websites, interactive television (iTV), applications and interactive content for handheld devices including smartphones, and online, PC, and console games (Screen Australia 2010b).

Games companies are eligible for the simplified Research and Development (R&D) Tax Credit that is intended to replace the Research and Development (R&D) Tax Concession. Small companies with an annual aggregate turnover of less than \$20 million are eligible for a 45% tax offset (equivalent to a deduction of 150%) for their R&D activities. Companies with an annual turnover of \$20 million are eligible for a 40% tax offset (equivalent to a deduction of 133%).

The Australian Government has provided financial assistance for games developers to develop export markets through its Export Market Development Grants scheme. Administered by Austrade, the scheme provided \$640,000 to computer games service businesses between 2003/2004 and 2008/2009 (Screen Australia n.d.). However, this amount only represents 2% of total funding allocated to audiovisual industries, and games services businesses have not received any grants since 2006/2007. The film industry received around 70% of the scheme’s funding over the seven-year period.

From 2003 to 2010, the Australian Government funded the Australasian Cooperative Research Centre for Interaction Design (ACID) “to innovate new ideas and generate new knowledge and understandings across the spectrum of interaction design”. Some of its projects involved the games industry.

Despite these initiatives, there continues to be a call for more government support to achieve a sustainable games industry, particularly given the current volatility of the market and the industry's inability to retain intellectual property (Screen Australia 2010a). In its submission to the Australia Government's *Review of Australian Film Funding*, the Games Developers' Association of Australia (2006) criticised the Government's framework and incentives for entertainment for not providing a level playing field, skewing investment into the film and television sectors. One of the initiatives proposed by the GDAA at the time was a \$40 million Games Investment Fund with institutional and individual components.

Victoria and Queensland are the main States that provide direct support to the games industry. Initiatives previously or currently available at a State level that contribute to the skilling of games workers include:

- ◆ the world-first Sony PlayStation 2, Xbox, and Xbox 360 development kit programs (Victoria)
- ◆ funding a motion capture studio at Deakin University (Victoria)
- ◆ assisting local game development companies to attend key overseas game shows such as the Games Developers Conference, Tokyo Game Show, Leipzig Games Convention, and Game Connection Europe held in Lyon (Victoria)
- ◆ supporting events such as Game Connect Asia Pacific (GCAP) and eGames expo (Victoria)
- ◆ new games development courses by educational institutions such as Victoria University, QANTM and the Academy of Interactive Entertainment (Victoria)
- ◆ Film Victoria's *Digital Media Prototyping Fund* that offers games developers up to \$500,000 to help develop a proof-of-concept prototype and attract a publisher; up to \$8,000 to develop cross-platform strategies; and a scoping program that offers up to \$5,000 to enable producers to research the viability of digital projects. The Victorian Government halved funding for these programs in its 2010/2011 budget (Digital Life 2010). In 2010, there was a review of Film Victoria's suite of digital media suite of programmes. It recently announced its *Games Investment Program* that provides funding of up to \$100,000 and no more than 50% of the project budget to assist game developers to create a prototype or a full game on any distribution platform (Film Victoria 2010).
- ◆ Film Victoria's digital media internship grants
- ◆ *Game Plan* which offers 25 new vocational training placements to fill skills gaps in specialised industry roles (Victoria)
- ◆ the *Interactive Games Industry Package* worth \$800,000 over four years from 2003 (Queensland)
- ◆ the introduction of the *Bachelor of Games and Interactive Entertainment* course at the Queensland University of Technology
- ◆ funding support for the *Creative Business Benchmark*, a tool available to creative businesses, including games developers, which prepares customised benchmarker reports that compare the performance of similar businesses (Queensland). The tool has been customised for the games industry to include a section dedicated to skills and education.
- ◆ South Australia's *Digital Tomorrow Program* aims to improve skills pathways, support digital media start-up programs, and encourage innovation by digital media companies operating in that State. Projects within the program include Tomorrow Pathways, Tomorrow Entrepreneur, Tomorrow Worlds, Tomorrow Studios, Tomorrow Start, and Tomorrow IP.
- ◆ As part of the New South Wales Government's \$36 million *Digital Economy Strategy*, the *Digital Media Initiative* will provide \$1.5 million a year for three years to support digital content, commencing in 2010/11. It will provide development grants of up to \$50,000 for early stage development; up to \$250,000 for advanced projects with strong commercial potential; and amounts above \$250,000 in special cases involving projects with exceptional commercial potential and market interest. It will also support businesses in the State to attend key international conferences.

(Australian Government Cultural Portal 2007; New South Wales Department of State and Regional Development 2008; QUT Creative Enterprise Australia 2010; CCI & Queensland Government 2010; Film Victoria 2010; Skills Hub 2010; Game Developers' Association of Australia 2006; South Australian Department of Trade & Economic Development 2010; New South Wales Industry and Investment 2010).

5.3 Education and training of Australia's games workers

Government (through subsidised fees), employers, and individuals fund education and training courses relevant to the games industry. **Appendix 6** lists games and games-related courses offered by providers in Australia. Examples of courses include the *Bachelor of Games and Virtual Worlds (Programming)*, *Bachelor of Interactive Entertainment* (Games Design, Games Programming or Animation majors), *Advanced Diploma of Professional Game Development* (Art or Software Development majors), *Advanced Diploma of Screen and Media (Game Artist)*, and short courses like *Character Creation* and *3D Studio Max for Game Making*.

John Cass, Managing Director of JMC Academy, said that degree programs offered by universities are better than short courses because they provide a much broader body of knowledge:

Short courses tend to focus specifically on certain types of software. Now, we all know that the specific type of software a student might learn might not be around forever ... What is important is that a student learns how to learn and be adaptive. Once graduates learn a solid foundation in the theory – why things work the way they do, critical thinking skills and how to learn – they can move from one program to another and one style to another.

(PC Power Play 2010)

However, Matthew Jeffrey from Electronic Arts claimed that game degrees are a “fashion accessory”:

The problem is that game degrees are almost like the latest fashion accessory – all the universities are running to set them up, but the students aren't being prepared in terms of the skills sets they have.

(Elliott 2008)

Bronwyn Lusted, Director of game recruitment company Conkerberry, is receptive to shorter courses:

... they can be more focused and that some of the year-long ones tend to react a little more quickly to changes in the industry than some of the longer degrees. When you boil it down, a good short course (of a year or two) will offer you the 'flow' of things, a good degree should offer you the 'why' as well.

(PC Power Play 2010)

Until 2006, *Cultural Research Education and Training Enterprise Australia* (CREATE Australia) was the national industry training advisory board on vocational education and training for the arts, media and cultural industries. It was responsible for working with industry, unions, the national Industry Training Advisory Boards (ITABs), government, employers and employees to ensure that the industry receives high quality, relevant and accessible vocational education and training. The national Innovation & Business Skills Australia (IBSA) (2010a) and State industry skills councils, such as the Creative Industry Skills Council (Queensland) and Creative and Leisure Industries Council (Victoria), are currently responsible for providing VET advice on workforce development and skills in the creative industries, including digital games. IBSA's role is to:

- ◆ provide integrated industry intelligence and advice to governments and Skills Australia on workforce development and skills needs (Note: as part of the re-structuring of Australia's VET arrangements following the adoption of the *Skilling Australia for the Future* initiative, the Australian Government set up the statutory authority, *Skills Australia*, to provide advice on Australia's current, emerging and future workforce development and skills needs).

- ◆ maintain and improve training materials and supporting products and services
- ◆ provide advice on skills, training and workforce development to enterprises.

As well as cultural and related industries, and information and communications technology (the games industry fits between the two), IBSA's industry coverage includes business, printing and graphic arts, finance, and education (IBSA 2008). IBSA manages the training packages that include VET qualifications relevant to the games industry: CUF07 *Screen and Media* and ICA05 *Information and Communications*.

Innovation & Business Skills Australia conducted the *Environmental Scan – 2010 Cultural & Creative Industries* (2010b) and the *Environment Scan – 2010 Information and Communications Technology Industries* (2010c). Both scans a) examined the key challenges facing the industries and considered their impact on workforce development in order to b) advise government of industry skills and workforce development needs, and on investment priorities for the Australia's VET sector (IBSA 2010b, p.1). The scans identified workforce challenges and critical future skills needed to meet these challenges. Table 6 shows future skills most applicable to the games industry, such as business planning skills due to changing business and employment structures, and IP protection and copyright knowledge due to the speed of technological change.

Table 6. Key challenges and critical future skills needs for the games industry

Challenge	Future skills needs
<ul style="list-style-type: none"> ▪ The speed of technological change 	<ul style="list-style-type: none"> ▪ IP protection and copyright, converging technologies, and Internet and digital business skills
<ul style="list-style-type: none"> ▪ Changing business and employment structures 	<ul style="list-style-type: none"> ▪ Knowledge management, communications and customer relations, and business planning
<ul style="list-style-type: none"> ▪ The global economy and business pressures 	<ul style="list-style-type: none"> ▪ Business management, negotiations and collaboration, and licensing, marketing and commercialisation.
<ul style="list-style-type: none"> ▪ Digital switchover 	<ul style="list-style-type: none"> ▪ Programming and systems design or wireless devices, and implementation and support of wireless technologies
<ul style="list-style-type: none"> ▪ Emergence of the digital economy 	<ul style="list-style-type: none"> ▪ Mobile applications and software development, business continuity/security, data farms, servers and data consolidation, and adaptability to diverse industries and contexts.

(IBSA 2010b)

In its 2009 review of digital games development (see Section 5.1), IBSA identified the primary demand for skills sets in the areas of foundation or essential skills in new media and web content creation; programming for games and 3D Interactive Media; and advanced programming for virtual games and 3D environments.

Table 7 taken from IBSA's report shows eight emerging vocational activities, a definition of these activities, and industries relevant to these activities. The eight activities are simulations, special effects, 3D and virtualisation, 3D digital art and rendering, interactive media, mobile games and application, mental fitness and business tools, and virtual and online games (p. 41). Most of the vocational activities aim to provide opportunities for workers to acquire skills to develop serious games.

Some key findings from the industry consultation phase of the review are worth noting (IBSA 2009, pp. 28-32):

- ◆ Demand for games developers, animators, special effects, and software and applications programmers will grow over the next three years.

- ◆ The Advanced Diploma of Professional Game Development (offered by the Academy of Interactive Entertainment) was the most relevant qualification.
- ◆ The Australian Institute of Entertainment was a respected provider with the most relevant courses.
- ◆ There was low awareness of the range of national courses and competencies available in their region.
- ◆ 'Hard edge' digital art, animation or programming technical skills and knowledge were the most relevant competencies.
- ◆ Some participants felt specialist digital art and game design oriented qualifications were most relevant; others felt programming and IT development skills were most relevant.

IBSA's 2011 environment scan for the cultural and creative industries identified Games Developer, 3D Animator and Visual Effects as occupations and jobs roles currently in demand.

Table 7. Emerging vocational activities for game development, game art, animation and programming skills

Vocational activity	Definition	Industry deployment & employment
▪ Simulations	▪ This includes walk through experiences, overviews and fly-throughs (architecture); or the modelling and simulation of extra-terrestrial environments or anatomy; training and strategy planning simulations and scenarios.	▪ Defence, mining, government, health, construction (building, architecture and design), space research, manufacturing, retail sales (motor vehicles, real estate, IT, etc.), environmental scanning, museums, and tourism
▪ Special effects	▪ Produce real life action using digital models and effects. This is often used to reduce risk, enhance visual effects or emotional engagement, it can lower the costs of production, or make the impossible possible	▪ Film, TV and entertainment
▪ 3D and visualisation	▪ Evolving from digital domain of computer aided design (CAD), this area covers 3D computer modelling, computer-generated animation, geospatial and 3D maps and cross-sections, 3D interactivity, 3D laser scanning, prototyping, stereo projection technologies, motion capture for characters, and digital to direct manufacture/production.	▪ Mining, urban design, manufacturing, product and industrial design, advertising and marketing
▪ 3D digital art and rendering	▪ Unique creations where individuals can configure avatars, environments and other digital asserts to reflex unique, personal contexts.	▪ Advertising, e-business, education, health, printing and graphic art, business packaging, and manufacturing
▪ Interactive media	▪ Creating interactive digital experiences that require human input to affect outcomes.	▪ Education, health, mining, entertainment, education and publishing
▪ Mobile games and applications	▪ The growing demand for applications and games that are enabled by next generation phones (iPhone), devices (handhelds), and telecommunications networks.	▪ Telecommunications, retail and entertainment
▪ Mental fitness and business tools	▪ The increased demand for tools to improve intelligence or test specialist knowledge.	▪ Telecommunications, entertainment, business, fitness – physical and mental, education
▪ Virtual and online games	▪ The development of virtual applications, tools and environments. Paradoxically, this area draws on and is responsible for growing many of the other categories above.	▪ Entertainment, film and TV, tourism, and real estate

(IBSA 2009, p. 12)

5.4 Skills standards and competencies of games workers

This section of the chapter unpacks skills standards and competencies for games workers in Australia and elsewhere. For Australia, Section 5.1 includes a summary of key aspects of IBSA's *Review of the Digital Games Development: Game Art, Animation and Programming* including the proposed *Diploma in Digital Games Development and Interactive Applications* and a draft *Digital Games Development Competency Framework* (0).

Industry feedback about the effectiveness of games courses suggest available game industry skills standards and competencies documentation do not adequately reflect the industry's demand for people who are capable designers, sophisticated team players, and innovators. Kline et al. (2003, p.199) pointed out:

Game development ... requires a synthesis of narrative, aesthetic, and technological skills to conceive, plot, and program virtual worlds, deploying the combined expertise of digital coders, graphics designers, software testers, scriptwriters, animators, sound technicians, and musicians.

The design and development process is collaborative, involves teams working in a studio, and can take one to two years for a high-end title (although mobile games require less time to develop). Perusal of the digital games online recruitment sites suggests the industry has mobilised a new elite workforce. A unique combination of digital artists and technicians working together in a highly competitive fast-paced industry demands experimentation in teamwork, charismatic leadership, ultra-flexible schedules, open-space work areas, flattened hierarchies, stock options and participative management. These expectations may explain why industry struggles to find and keep the right people.

Preston et al. (2009) focussed on the requirements for successful innovation in the digital media sector. Their case studies emphasised that technical skills, competencies, and expertise are necessary but not sufficient for successful industrial innovation strategies in the digital media sector. They concluded that four knowledge domains provide the essential mix of knowledge inputs to innovation in the sector:

- ◆ Technical knowledge
- ◆ The specific new 'soft communication' knowledge forms related to digital media authoring, design, textual/editorial, and production functions, as well as intangible (tacit, creative) knowledge such as experience of, and building reputation through, working on content titles
- ◆ New policy knowledge that addresses the specificities of the media sector and is better attuned to its organisational and industrial culture

- ◆ Sectorally specific business, entrepreneurial, policy, and/or regulatory knowledge.

The Lake Washington Technical College released *Skills standards for electronic game content production* in 2003. The 202 skills standards are exclusively occupational technical knowledge (192 standards) and skills (10 standards) grouped into 10 categories: creation, computer concepts, hardware, software, game engine, project management, tools, art and design concepts, quality control and testing, and industry concepts and practices. The only skills remotely similar to the industry's need for collaborative multidisciplinary team skills are in:

- ◆ communicating design concepts to clients and technical team members
- ◆ evaluating visual impact and technical limitations in context of multiple platforms and system configurations
- ◆ selecting media type or combination of media types to communicate the content area
- ◆ skills in teaching others technical skills.

UK's SkillsSet released the *National Occupational Standards for Interactive Media and Computer Games* in June 2009. Industry practitioners, employers and other key stakeholders developed the standards to show exactly what is required of professionals in the industry. The standards consist of "core" skills and "supporting" skills. While most of the "core" skills are very technical in nature, the prominent first core competency is *Work Effectively in Interactive Media*. This competency covers high-level attributes "that everyone working in interactive media needs, regardless of their role or function". Some of the "supporting" skills fall within the following two groups:

- ◆ Personal skills – Manage your work, Work with others, Keep your skills up to date
- ◆ Business and management skills – Develop and manage a business, Sales and Marketing, Manage Projects, Manage People, and Freelancing.

The standards include the skills that games designers, games programmers, and testers/QA technicians need to work effectively in the industry.

- ◆ A **Game Designer** must be able to: 1) analyse, deconstruct and learn from existing game designs; 2) devise and document game rules; 3) specify the characteristics of the game world in sufficient detail for realisation by others; 4) specify the attributes and behaviours of objects and characters in the game world in sufficient detail for realisation by others; 5) liaise with other colleagues involved in the creative or quality assurance process to ensure the game design can be realised effectively; 6) prototype design ideas and develop proofs of concept; and 7) effectively present games to appropriate stakeholders.

- ◆ A **Game Programmer** must be able to: 1) use the specified development environment or coding tool effectively; 2) code programs or program components to provide specified functionality; 3) produce modular code; 4) clearly document and comment [on his/her] code so that others can understand it; 5) create efficient code that is easy to read and maintain; 6) liaise with colleagues to ensure designs and specifications are correctly implemented; and 7) respond positively to requests for changes to work schedules, timescales and product features; and use version control and asset management systems to ensure full back-up of your work.
- ◆ A **Tester/QA Technician** must be able to: 1) follow the test brief or other provided instructions accurately; 2) identify and communicate clearly and constructively any problems with specific aspects of the product, as per the evaluation criteria; 3) report any bugs [encountered] in the software in a clear, concise and logical manner; 4) report bugs using the appropriate method and procedure; 5) respond constructively to written or verbal communications regarding submitted bug reports from other members of the development team; 6) follow any specified bug reporting process; and 7) be patient, persistent, professional and systematic.

SkillSet's (2009, p. 4) opening statement in its report (see box below) aims to explain the design of the standards.

The International Games Developers Association (2008) proposed a curriculum framework based on a cross-disciplinary approach to games-related education that aims to address concerns that graduates "know a little bit of each part of games design and development, [but] do not have in-depth knowledge of any particular area" (p. 6). The framework consists of nine core topics that IGDA believes addresses the unique practical and

theoretical concerns of games. Topics include critical games studies, games and society, games design, games programming, visual design, audio design, interactive storytelling, game production, and business of gaming. Examples of content in some core topics that are less technical include gaming demographics and cultures of gaming, ethical and social issues in games, the concept of fun, instructional design (serious games), player analysis, literary theory and narratology, game advertising, workflow, group dynamics, games industry economics, and content regulation. See **Appendix 7** for full curriculum framework.

In Australia, national VET qualifications, units of competency and assessment guidelines for the games industry are mainly located in two training packages: CUF07 *Screen and Media* and ICA05 *Information and Communications*. Key VET qualifications in these packages targeting the games industry are as follows:

CUF07 *Screen and Media*

- ◆ Advanced Diploma of Screen and Media – streams include 3D animation and Visual FX, Game Artist, and CGI and Visual Effects
- ◆ Advanced Diploma of Screen and Media (Interactive Digital Media)
- ◆ Diploma of Screen and Media (includes a stream for Animation)
- ◆ Diploma of Interactive Digital Media

ICA05 *Information and Communications*

- ◆ Diploma of Information Technology (Systems Analysis and Design)
- ◆ Diploma of Information Technology (Multimedia)
- ◆ Diploma of Information Technology (Software Development)

(National Training Information Service 2010a, 2010b)

Interactive media requires a unique set of skills. Practitioners typically need a combination of specialist skills drawn from at least two of the design, technical, content and business or management disciplines. For example, an interactive media account manager needs to have at least some understanding of the technical and creative issues inherent in the production process; a designer needs to understand both the project's technical constraints and its business objectives; a web programmer needs to be aware of usability and design issues.

A mixture of transient, enduring and transferable skills is needed. Specialist transient skills include, for example, expertise in particular software packages, hardware platforms and other technologies, which may change or develop over time. Specialist enduring skills underpin these transient skills and provide an essential foundation for long-term career development. They include, for example, high-level understanding of broad design theory (encompassing product, audio, information, visual, interaction and systems design); software programming principles; and creative and concept development abilities. More general transferable skills include personal and work skills (such as communication, presentation and time management); self-management; research and study skills; and use of ICT.

Practitioners working in interactive media also need an all-round awareness of the industry, its processes and business issues as a whole. In particular, they need awareness of the other interactive media skills sets beyond their own specialities; users and usability; commercial and marketing requirements; and legal issues relating to intellectual property.

The nature of the interactive media industry also requires practitioners to have certain attitudes relating in particular to skills acquisition and working practices. Successful practitioners need to be flexible, adaptable, self-motivated and autonomous, with an entrepreneurial attitude and a willingness to continue learning. They must have a broad outlook and be willing to embrace hybrid skills and cross-disciplinary roles.

Finally, a crucial component is experience. While some skills can be taught academically, and others can be gained through work in other industries, inevitably there are some that can only be acquired through direct experience in the interactive media industry itself. (Skillset 2009, p. 4)

There are also a number of nationally recognised VET qualifications accredited by States, such as the *Advanced Diploma of Professional Game Development* (ACT), *Diploma of Information Technology (Games Development)* (NSW), *Diploma of 3D Animation and Digital Effects* (NSW), and *Diploma of Interactive Games Development* (WA).

In its review, IBSA (2009) grouped competencies for games courses at the Diploma and Advanced Diploma levels into the vocational categories of digital media design, animation, animation detailed (NSW), digital media design (games), 3D and digital effects, virtual worlds, and programming. See **Appendix 8** for a listing of competencies for each category. Stakeholders who participated in IBSA's survey ranked Diploma and Advanced Diploma competencies in order of relevance (see Table 8). The competency of most relevance was *ICAA4058B Apply skills in object-oriented design*, and the competency of least relevance was *CUFDIG503A Design e-learning resources*.

5.5 Education and training issues and proposed solutions

This chapter so far has discussed Australia's position on the skilling of games workers; government support to develop Australia's games industry and workforce; and games education and training, including standards and competencies for games workers. The review of existing Australian reports in Section 5.1 identified well-known issues about the games workforce, such as skills shortages and mismatches, and the need for ongoing education and training of workers due to the rapid pace of change in the industry. This section looks more closely at concerns related to education and training for the games industry, and solutions proposed to address some of these concerns.

The *Working in Australia's Digital Games Industry* study (this study) included a poll and Worker Survey asking participants to state the effectiveness of games courses.

Table 8. Diploma and Advanced Diploma competencies for games courses ranked by most relevant

Competency	Average Relevance
	5 = Very High, 1 = Very Low
ICAA4058B Apply skills in object-oriented design	4.60
CUFANM501A Create 3D digital character animation	4.43
ICAB4219B Apply introductory object-oriented language skills	4.40
ICAB5226B Apply advanced object-oriented language skills	4.40
CUFANM502A Create 3D digital environments	4.29
ICAB4075B Use a library or pre-existing components	4.20
ICAITB170A Build a database	4.20
VBP024 Develop graphical user interfaces (GUIs) for virtual worlds	4.17
VBP026: Develop 3D environments for virtual worlds	4.17
CUFDIG505A Design information architecture	4.17
CUFANM503A Design animation and digital visual effects	4.17
CUFDIG506A Design interaction	4.14
VB324 Create 3D characters for games	4.00
VB326 Create design documents for games	4.00
NSWTGAM501A Produce 3D components for interactive games	4.00
NSWTGAM502A Design 3D game levels and environments	4.00
VBP025: Develop scripts for virtual worlds	4.00
BSBEBUS508A Build a virtual community	4.00
ICAITB182A Write and compile code, based on requirements	4.00
ICAITAD042B Determine client business needs	4.00
CUFDIG504A Design games	3.86
CUFDIG507A Design digital simulations	3.86
WA50661FTI08A Produce an interactive game project	3.86
WA50661FTI09A Design interactive game play	3.86
(NSW Competencies)	3.83
VB323 Develop graphical user interfaces (GUIs) for games	3.83
WA50661FTI03A Identify and apply knowledge of game playing	3.83
VB325 Create 3D environments for games	3.80
VB327 Develop scripts for games	3.80
ICAITB181A Write and document program modules	3.80
ICAITT082A Manage the testing process	3.80
ICPMM61DA Prepare multimedia for different platforms	3.80
ICAITB137A Produce basic client side script for dynamic web pages	3.50
ICAITB068A Build using RAD	3.50
CUFDIG501A Coordinate the testing of interactive media products	3.43
CUFDIG502A Design web environment	3.40
ICPMM581B Manage multimedia production	3.40
CUFDIG503A Design e-learning resources	2.67

(IBSA 2009)

A staggering 84% of the 279 poll participants indicated that games courses in Australia were 'highly ineffective' (Table 9). Those who participated in the Worker Survey were less critical: 16.1% indicated games courses were 'highly ineffective' and 33.9% indicated games courses were 'somewhat ineffective'.

Table 9. Responses to the poll and survey question on the effectiveness of games courses

	Poll N=279	Worker Survey N=56
Highly ineffective	83.9% (n=234)	16.1% (n=9)
Somewhat ineffective	4.3% (n=12)	33.9% (n=19)
Neutral	3.2% (n=9)	25% (n=14)
Somewhat effective	6.5% (n=18)	23.2% (n=13)
Highly effective	2.2% (n=6)	1.8% (n=1)

The Worker Survey asked participants about factors influencing employers' recruitment decisions. Figure 22 shows 91% of participants rated having the "right job skills and knowledge"; 78% of participants rated having "creative talent"; and only 45% participants rated having the "right qualifications" as 'important/very important' to employers' recruitment decisions. These findings suggest some employers are less satisfied with games courses.

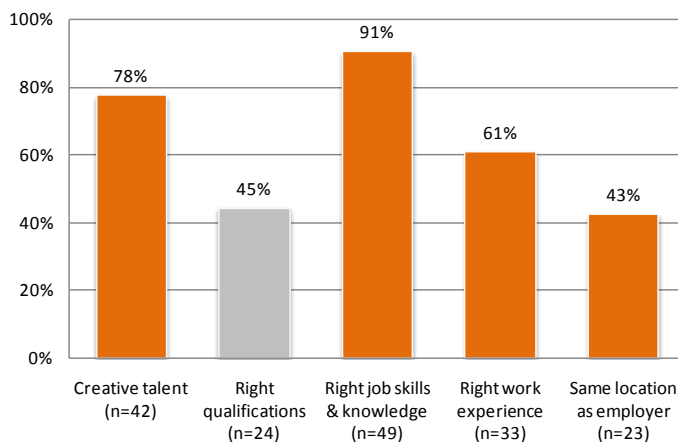


Figure 22. Factors that workers rated 'important/very important' to employers' recruitment decisions

Worker Survey participants and blog respondents suggested ways to improve current education and training courses to better equip graduates to work in the games industry now and in the future. **Appendix 9** contains all responses to the questions related to improving games courses. Suggestions are similar to those discussed in previous studies:

- ◆ Availability of appropriate tools, software, technology, and expertise at educational institutions
- ◆ Expose students to the full project lifecycle experience, including the time and scope during the latter part of their course to create, finish, ship, and sell an independently-developed game

- ◆ Strong industry collaboration with educational institutions, including a curriculum driven by industry instead of educational institutions
- ◆ More industry placements, internships and apprenticeships at games companies to provide students with practical experience
- ◆ Educational institutions to provide students with a framework to produce a showreel to help them to secure their desired junior position and in the process hopefully to produce a game.

UK's Digital Native Academy 2008 report, *An Investigation into the Labour Market and Skills Demands of the Games and Serious Games industries*, identified issues related to education and training provision for the games sector and proposed solutions that could help address these issues at both a national (UK) level and regional (West Midlands) level. The issues focused around the following five themes:

- ◆ *Matching demand and supply in the games industry*
There is an oversupply of games courses leading to an oversupply of graduates lacking relevant technical skills, commercial understanding, and communication and team-working skills. These graduates seek to work in an industry experiencing a shortage of skilled labour, particularly at senior and management level; is only interested in the 'brightest and the best' graduates; and regards the content of degree courses as often outdated, of insufficient depth, and sometimes irrelevant to the games industry. As a result, companies prefer graduates from traditional courses such as Physics, Mathematics, Computer Science or Art/Animation rather than the vocational games courses.
- ◆ *Industry recruitment and training for entry-level roles*
The industry lacks a strong culture of training and development. Only large companies tend to provide formal induction or initial training for new entrants that extend past the allocation of a mentor. Although companies indicated work placements (preferably longer placements), improved commercial understanding and the work-readiness of graduates, many companies find it difficult or not beneficial to them to provide workplace opportunities.
- ◆ *Educational provision: content, delivery and outcomes*
Rather than being developed from scratch and considering any accreditation criteria, many games courses are repackaged or reconstituted from existing modules, and are not coherent, well-designed or ideal for a purpose. Industry and providers often perceive the relevancy of degree programmes and the work-readiness of graduates differently. There is variation of degree courses within and between providers. Providers experience internal constraints and barriers to effective provisions, such as staff experience and recruitment difficulties, lower entry requirements for courses, and

staff not focusing on industry standards and requirements when developing courses. Finally, very little is known about the expectations and final destinations of students.

◆ *The Serious Games Industry*

Games companies involved in the emerging serious games industry regard games degrees as being largely relevant to purposes of entertainment. As a result, they recruit from a broader and a wider range of degrees. There is a need for links between providers and companies involved in serious games to identify the range of skills needs for serious games development, and to determine how to translate these needs into educational provision.

◆ *Industry-education links*

The links between employers and providers are often ad hoc, underdeveloped or not maintained. Links need to be forged at the right levels and ensure they can be utilised for strategic and developmental purposes.

(Digital Native Academy 2008, pp. 64-71)

See **Appendix 10** for the Academy's recommendations to address these issues, which include:

- ◆ providing information and exchange to companies that enable them to see the value of training and development, particularly for inexperienced staff
- ◆ supporting initiatives that create or support work placements for students, within degree programmes, through simulations, or postgraduate work
- ◆ developing stronger industry-education links, in particular through a forum, to help ensure that education provision meets the needs of industry in the region more effectively
- ◆ encouraging providers to consider the main features of courses that are recognised as being excellent/ best-practice, whether accredited or non-accredited
- ◆ identifying the range of skill needs for serious games development for possible translation into education provision
- ◆ addressing the lack of knowledge and data about graduates' motivations, expectations and destinations.

In June 2009, the Department of Culture, Media and Sport and the Department of Business, Innovation and Skills in the United Kingdom released *Digital Britain*. The impetus of the report was the need for Britain to maximise the benefits from the digital revolution through a programme of action. The report chapter, *Creative Industries in the Digital World*, identified a shortage of skills as a key challenge faced by the UK games industry. One of the reasons given for the

shortage was companies "actively avoiding recruiting from many of the UK's higher education games courses, most of which they regard as inadequate, preferring maths and science graduates" (p. 128). The report identified two actions to address concerns about higher education games courses:

- ◆ The forthcoming *Higher Education Framework* would lead to demand-led courses to address skills gaps and courses that "combined 'hard' excellence in Science, Technology and Mathematical skills with 'softer' excellence in business and creative skills" (p.129)
- ◆ The UK Government to investigate the feasibility of a new *Usability Centre for Video Games* to "address issues around skills development offering graduates the work related training necessary to enable them to secure their first job in the industry and helping to bridge the current gap" (p. 129).

Michael Zyda (2009) described the success of his "gamepipe lab" at the University of Southern California in responding to the some of the issues already discussed:

We've revolutionised the curriculum and delivery ... At the end of each academic year, we now routinely place large numbers of students (typically around 35) in internships/jobs in the game industry where they are nearly instantly productive. We have also been able to create a line of research funding based on and around games. It is more than difficult to build an R&D program on games without a pipeline of students learning to build them. Today, we have both.

To improve the standard of courses, TIGA (the trade association for the games industry in the U.K.) called for the establishment of a Games Education Fund to pay for the placement of lecturers in games businesses, finance research fellowships, help developers work with universities, and award individual lecturers and universities for excellence in teaching (Fear 2008). NESTA (2008) proposed that governments offer more incentives for the design of curricula relevant to industry, such as a 'kitemark' scheme linked to funding for games courses.

Chris Swain (2009) in his article, *Improving Academic-Industry Collaboration for Game Research and Education*, identified barriers to education-oriented collaborations and research-oriented collaborations, and proposed solutions to address these barriers (see the box on the following page). Examples of barriers include university culture clashing with industry culture and the games industry having little understanding of academia or academic research. Examples of proposed solutions include student showcases, salons and collaborative classes, and establishing a meta-organisation that is a single face for game-related programs and researchers.

Extracts from Swain (2009), *Improving Academic-Industry Collaboration for Game Research and Education*

Education-oriented creative collaborations with academia

Barriers:

- ◆ Universities put student needs first and typically take a long-term view towards curriculum. University culture sometimes clashes with industry culture e.g. when a university program can't immediately insert a new class or tool into the curriculum.
- ◆ Students from academic game programs who go to industry, either as interns or full-time hires, need to be humble and enthusiastic about tasks assigned, given they are stereotyped as acting "entitled" and this can cause tension in the workplace.

Proposed solutions:

- ◆ Student showcases via university demo days, game festivals, and digital distribution.
- ◆ Sponsored contests, particularly contests that can be structured as class assignments, which involve quite a bit of lead time because of the time taken for universities to adapt curriculum to fit with contest requirements.
- ◆ Mentoring by self-selected professional games developers who are generous with their time when it comes to helping students, have a natural calling for mentoring, and natural teaching personalities.
- ◆ Guest speakers and speaker series, particularly in game classes in person or via video-over-IP programs such as Skype. Students can read about the guest speaker online the week before and submit questions to him or her. Students with the best projects (selected via a contest) will win the opportunity to demo the game to the guest speaker.
- ◆ Offering adjunct professorships for people from industry; and pairing adjuncts together or pairing one with a full-time professor to jointly teach a class to deal with travel obligations and unexpected deadlines.
- ◆ Collaborative classes taught in partnership with a company from industry, with students learning about industry game development problems and doing assignments that are similar to what industry teams do. These classes should provide regular access to at least one technical person at the company, and the use of online wikis for efficient communication between the students, faculty and industry mentors.
- ◆ Salons where students pick an interesting game; play it all the way through; create in-depth, comparative literature-style presentations of the game that include a demonstration of all game play features as well as critical commentary; and deliver the presentation to interested developers.
- ◆ Internships programs and other solutions like Faculty members learning about the character and abilities of individual students, beyond resumes and portfolios, in order for industry to recruit and screen students.

Research-oriented academic-industry collaborations

Barriers:

- ◆ Games companies have the ability to pursue concepts internally with complete control and with a history of success, employing world-class programmers and designers.
- ◆ Culturally, the games industry has little understanding of academia or academic research. Many games developers did not attend college, working their way up from the bottom.
- ◆ Academic deadlines are disjointed from the commercial deadline-oriented industry.
- ◆ Different departments and schools within universities do not coordinate well.

Proposed solutions:

- ◆ Developing a meta-organisation for games that is a single face for games representing, potentially, a diversity of game-related programs and researchers.
- ◆ Tool-based academic-industry collaboration, in particular open source software that provides a technical collaboration but does not come with prohibitive transition costs between participants.
- ◆ Industry benefits from the fruits of the established research community and the publishing process rather than funding it.
- ◆ Undirected games research in universities via innovative student games projects coming out of games programs, without the pressure to get a financial return.

According to IGDA (2008, p. 1), the benefits of better links between industry and providers are:

- ◆ facilitating the transition of new technologies from research labs into products
- ◆ enriching education by bringing industry experience into the classroom
- ◆ engendering more critical approaches among game creators
- ◆ enhancing understanding of contemporary media culture
- ◆ fostering a deeper exchange between academics and game developers.

The Review of Australian Higher Education (known as the Bradley Review) included key findings from over 350

submissions from individuals, institutions, and peak bodies in education, industry and professions (Australian Government 2008). Although not focussing on specific industries, barriers to course and program development are similar to those experienced by the games industry and already discussed in this section. They include a lack of information on the future supply of and demand for skills, and the largely ad hoc arrangements in higher education's collaboration with industry. Submissions to the Bradley Review highlighted a need for "improved collaboration between industry and higher education providers to identify areas of need and develop courses and programs"; and for providers to be more responsive and flexible in the delivery of courses, such as offering short-term courses for the upskilling of the existing workforce (DEEWR 2008, p. 210).

In February 2011, NESTA and Skillset released findings from a skills review of video games and visual effects industries in the United Kingdom. The report, *Next Gen: Transforming the UK into the world's leading talent hub for the video games and visual effects industries*, highlighted many of the issues already discussed in this report and proposed recommendations to meet the skills needs of these industries. The report highlighted issues like the oversupply of graduates from specialist universities courses for the number of available jobs, and the severe misalignments between the education system and what the UK video games and visual effects industries need

(p. 5). The report includes 20 recommendations placed in one of three categories: schools; universities, colleges and vocational education; and training and continuous professional development (see Table 10). Implementing the recommendations would involve:

... a redirection of existing government resources, not for new ones. Nor do they require significant funds from industry or educators. But they do require a real drive and shared sense of purpose from all three if we are to re-invigorate a British success story with the talent it needs to thrive. (p. 6)

Table 10. Recommendations to assist the U.K. in transforming itself into the world's leading talent hub for the video games and visual effects industries

Schools	
Recommendation 1	Bring computer science into the National Curriculum as an essential discipline.
Recommendation 2	Sign up the best teachers to teach computer science through Initial Teacher Training bursaries and 'Golden Hellos'.
Recommendation 3	Use video games and visual effects at school to draw greater numbers of young people into science, technology, engineering and mathematics (STEM) and computer science.
Recommendation 4	Set up a one-stop online repository and community site for teachers for video games and visual effects educational resources.
Recommendation 5	Include art and computer science in the English Baccalaureate.
Recommendation 6	Encourage art-tech crossover and work-based learning through school clubs.
Recommendation 7	Build a network of STEMNET and Teach First video games and visual effects Ambassadors.
Recommendation 8	Introduce a new National Video Games Development and Animation Schools Competition.
Recommendation 9	Design and implement a Next Generation of Video Games and Visual Effects Talent Careers Strategy.
Recommendation 10	Provide online careers-related resources for teachers, careers advisers and young people.
Universities, colleges and vocational education	
Recommendation 11	Develop kitemarking schemes, building on Skillset accreditation, which allow the best specialist HE courses to differentiate themselves from less industry-relevant courses.
Recommendation 12	Higher Education Funding Council for England (HEFCE) should include industry-accredited specialist courses in their list of 'Strategically Important and Vulnerable' subjects that merit targeted funding. Industry commits to these courses through industrial scholarships and support for CPD for lecturers.
Recommendation 13	Raise awareness of the video games and visual effects industries in the eyes of STEM and arts graduates.
Recommendation 14	Give prospective university applicants access to meaningful information about employment prospects for different courses.
Recommendation 15	Develop a template for introducing workplace simulation into industry-accredited video games and visual effects courses, based on Abertay University's Dare to be Digital competition.
Recommendation 16	Leading universities and FE colleges sponsor a high-tech creative industries University Technical College (UTC), with clear progression routes into HE.
Recommendation 17	Kitemark FE courses that offer students the best foundation in skills and knowledge to progress into Higher Education.
Training and continuous professional development	
Recommendation 18	Skillset Creative Media Academies and e-skills UK's National Skills Academy for IT to work with industry to develop specialist CPD training for video games and visual effects industries.
Recommendation 19	Support better research-oriented university-industry collaborations in video games and visual effects.
Recommendation 20	Continue to treat the 18 visual effects occupations on the Government's shortages list as shortage occupations.

(NESTA & Skillset 2011, p. 7)

5.6 Country comparisons

UK Trade & Investment's *Playing for Keeps: Challenges to sustaining a world-class UK games sector* report identified the labour market as one of the critical areas influencing a country's ability to create games IP (see Section 4.4 for further information about this report). The labour market area consists of the indicators of the number of institutions offering games-related courses, number of graduates per annum, number of development jobs, university-industry linkages, and flexibility of employment laws. Indicators relevant to education and training shown in Table 11 suggest that Australian institutions are producing too many graduates from games and games-related courses for Australia's small games industry. Games graduates per university per annum in Australia in 2007 (40 graduates) was the highest of all the countries included in Table 11, and the ratio of development jobs to graduates per annum in Australia at only 2.1 jobs was the lowest of all countries.

The following descriptions of university-industry linkages indicate why UK Trade & Investment (2007) gave Canada and the United States a 'good' rating and Australia a slightly lower rating of 'medium-good'. The main reasons given for good linkages in Canada and the United States were a) greater government and industry investment in R&D programmes leading to company spins-offs and start-ups i.e. the ability to "extract, exploit and harvest commercially viable ideas initially incubated in universities" - a key weakness of the UK games industry (p. 60); and b) companies working closely with selected institutions to produce graduates that meet their needs. Descriptions of linkages from the report for Australia, Canada and the United States are as follows:

- ◆ *Australia* - Universities and games companies have collaborated to obtain substantial grants from local governments (for instance Auran and University of Queensland for online functionality for Auran's Trainz game). There appear to be few structural problems in harvesting value from university-developed games or technologies, and a number

of universities and research centres have games-related programmes designed to drive commercial ideas into the market (p. 10).

- ◆ *Canada* - Policy makers regard universities as seed banks for industrial innovation, jobs and start-ups companies, and companies originating in universities in Canada are well funded by local and federal government. The federal government funds a US\$70 million R&D programme via the Network of Centres of Excellence, which encompasses hundreds of companies, provincial and federal government departments and agencies, hospitals and 150 universities, which has resulted in 10% of the 800+ company spin-offs in the past few decades, and stimulated investments of US\$62 million, including more than US\$24 million by participating private-sector companies. Games spin-offs include Darwin Dimensions, a facial animation company in Québec, and Quazal, a leading multi-player games middleware provider, one of whose founders came out of the Royal Canadian Military College. Ubisoft funds a campus in Montreal in conjunction with Sherbrooke University, which outputs 100 students (and trains 200 employees) per annum, from which it harvests almost all for its rapidly expanding Montreal studio. EA funds a similar academy in Vancouver. (p. 20)
- ◆ *United States* - The USA has none of the structural problems in harvesting value from university-developed games or technologies found in the U.K.. In contrast, it is a well-worn path for start-ups. By 2000, MIT's Lincoln Laboratory alone had spun off more than 65 technology companies, generating over US\$15 billion of sales. A number of universities work closely with games companies. In a good recent example, Valve took a student project from DigiPen which resulted in a game called *Portal*, now on Valve/EA's product roadmap. EA also regularly shops for new hires at Carnegie Mellon, among other universities. (p. 75)

Table 11. Games education and training benchmarks

	Australia	Canada	France	S Korea	Singapore	U.K.	USA
No. of institutions offering games courses	15	48	7	33	5	45	200
Games graduates p.a.	600	800	250	800	100	1,200	4,700
Graduates per university p.a.	40	17	36	24	20	27	24
Related graduates per annum	25,000	43,700	n.a.	n.a.	36,500	26,000	85,000
Number of development jobs	1,250	6,100	1,750	9,000	500	8,300	25,000
Ratio of no. of development jobs to games graduates per annum	2.1 to 1	7.6 to 1	7 to 1	11.3 to 1	5 to 1	6.9 to 1	5.3 to 1
University-industry linkages	Medium-good	Good	Low-medium	Medium-good	Good	Low-medium	Good

(UK Trade & Investment 2007, p. 80)

Acknowledging that dominant skills sets required by the games industry in the seven countries today may be different to those identified by UK Trade & Investment in 2007, they are still relevant given they reflect the current market focus in these countries. Demand for specialist workers with online games development experience was dominant in Australia, Singapore and South Korea, whereas demand for workers with experience “across the board” was dominant in Canada, France, United Kingdom, and the United States. The dominant skills sets required by each country in 2007 are as follows:

- ◆ *Australia:* Specialty in online games development, casual games and handheld
- ◆ *Canada:* Strong across the board, with broad online and wireless experience as well as many next generation titles and most genres
- ◆ *France:* Broad range of skills with a focus on tools and middleware
- ◆ *South Korea:* Online, casual and mobile games
- ◆ *Singapore:* Mobile (J2ME) and online casual games (Flash), but no experience on consoles nor, surprisingly, much on PC
- ◆ *United Kingdom:* Largely strong across the board, especially technical and creative skills sets such as design, gameplay, programming, physics, artificial intelligence and animation
- ◆ *United States:* All, with a skill set in PC and online gaming concentrated in the Austin cluster.

(UK Trade & Investment, 2007, pp. 11-75)

5.7 Chapter summary

This chapter examined existing Australian reports relevant to the games industry; identified previous and current government support designed to contribute to the development of Australia's games industry and workforce; and provided an overview of education and training provision, including skills standards and competencies, issues and proposed solutions, and comparisons with selected countries. Key findings are as follows:

- ◆ The review of key reports relevant to Australia's games industry identified the following ongoing skills issues: Skills shortages and gaps; insufficient/ineffective linkages between industry and providers; rapid pace of change means workers need access to ongoing education and training; mismatch of graduate skills and industry needs; a lack of local experience and skills resulting in expensive and time-consuming overseas recruitment; critical importance of certain non-technical skills; teachers with insufficient industry experience; and shortages of structured on-the-job training opportunities.

- ◆ The Australian Government provides some support to the games industry through organisations like Screen Australia and the new Creative Industries Innovation Centre. The Victorian and Queensland Governments are the main State Governments that directly support games companies operating in these States. Overall, the level of Government investment in the industry is not sufficient to stimulate growth or help address the skills issues.
- ◆ Many education and training providers in Australia offer games and games-related courses. However, games companies often prefer graduates from particular courses and providers, such as the *Advanced Diploma of Professional Game Development* offered by the Academy of Interactive Entertainment.
- ◆ The IBSA 2009 review of qualifications, skills and units of competencies for digital games development identified demand for skills sets in the areas of foundation or essential skills in new media and web content creation; programming for games and 3D Interactive Media; and advanced programming for virtual games and 3D environments. IBSA (2011) recently identified Games Developer, 3D Animator and Visual Effects as occupations and jobs roles currently in demand.
- ◆ The analysis of skills standards, competencies and frameworks in different countries found students are expected to develop technical/specialist knowledge, and to an increasing extent, business, management, and generic/transferable skills and attributes, such as time management, communication, flexibility and self-motivation. The curriculum framework based on a cross-disciplinary approach to games-related education developed by the International Games Developers Association (IGDA) is comprehensive, consisting of nine core topics that IGDA believes address the unique practical and theoretical concerns of games.
- ◆ Polls undertaken as part of this study found 84% of participants indicated that games courses in Australia were ‘highly ineffective’; and when asked about the factors that were ‘important/very important’ to employers’ recruitment decisions, 91% indicated having the right job skills and knowledge, 78% indicated having creative talent; and 45% indicated having the right qualifications.
- ◆ UK's Digital Native Academy (2008) summed up the issues common to games education and training: Oversupply of games courses leading to an oversupply of graduates who are not industry ready; the industry lacks a strong culture of training and development; concerns about the quality of content, delivery and outcomes; games companies involved in the serious games industry recruiting from a broader and a wider range of degrees rather than games courses; and ad hoc, underdeveloped or not maintained links between employers and providers.

- ◆ Some of the ways suggested to improve the skilling of games workers include courses with student showcases, salons and collaborative classes (Swain 2009); a meta-organisation that is a single face for game-related programs and researchers (Swain 2009); providers considering the main features of courses recognised as being excellent/best-practice, whether accredited or non-accredited (Digital Native Academy 2008); identifying the range of skill needs for serious games development for possible translation into education provision (Digital Native Academy 2008); a Games Education Fund (Fear 2008); more incentives for the design of curricula relevant to industry, such as a 'kitemark' scheme linked to funding for games courses (NESTA 2008); a one-stop online repository and community site for teachers for video games and visual effects educational resources (NESTA & Skillset 2011); and raising awareness of the video games and visual effects industries in the eyes of science, technology, engineering and mathematics (STEM) and arts graduates (NESTA & Skillset 2001).
- ◆ Education and training providers may be graduating too many people and offering too many games and games-related courses for Australia's small games industry.
- ◆ Greater government and industry investment in R&D programmes leading to company spins-offs and start-ups; and companies working closely with selected institutions to produce graduates that meet their needs are key reasons why Canada and the United States have good university-industry linkages (UK Trade & Investment 2007).
- ◆ In 2007, demand for specialist workers with online games development experience was dominant in Australia, Singapore and South Korea, whereas demand for workers with experience "across the board" was dominant in Canada, France, United Kingdom, and the United States (UK Trade & Investment 2007).

6. Conclusion

This final chapter of the report represents a summary of the main points arising from the consolidation study. It also discusses seven areas that stakeholders could investigate further and summarises the approach to develop a *Future Skills Strategy for Australia's Digital Games Industry*.

This consolidation study identified resources that describe Australia's digital games industry as one that excels globally; has huge potential for future economic growth; offers the best in creative talent, advanced technology and management experience; and is an emerging sector experiencing strong global growth (Australian Centre for the Moving Image 2008a; DCITA 2008; GDAA 2010; Buchan Consulting 2005). Other resources describe the industry as a small, active and still maturing sector of the Australian economy; a niche player likely to remain so; a small market that has grown slowly; and lacking high quality experienced indigenous development staff (UK Trade & Investment 2007; IBSA 2009). This study has not explored the reasons for the differences in viewpoints.

What is obvious is that Australia's games industry operates in an international environment where the extraordinary growth in local and global consumer spending on games is likely to continue, particularly spending on online and wireless games – a market in which Australia is starting to perform well. Like games industries in other countries, Australia's game industry increasingly relies on workers who have highly specialised skills as well as skills to manage projects, people and businesses. They must have the ability to learn and adapt quickly to cope with complex changes in games design, new technology, new markets, and changing consumer demographics and needs.

Games and games-related reports and articles highlight a range of issues affecting the industry's workforce that persist today. Some of these issues are not unique to Australia. They contribute to skills shortages and gaps, made worse by the loss of local talent to overseas games companies. Consequently, Australia's games industry relies on expensive and time-consuming overseas recruitment (House of Representatives Standing Committee on Communications, Information Technology, and the Arts 2004).

Issues of most concern to this study are those related to the skilling of new and existing games workers. Education and training providers must be able to respond effectively and in a timely way to the industry's current and emerging skills requirements. This responsiveness requires strong linkages between providers and games companies to enable providers to understand industry needs, broker on-the-job training

opportunities with companies, and inform companies about their approach to education, training and research. Games companies must provide new and existing workers with ongoing education and training, and take on greater responsibility for the skills development of students.

This study involved sifting through publicly available resources over the last decade and drawing on selected findings from this study's Worker Survey, polls and blog questions. The search focused on resources that explain key concepts and definitions relating to the games industry and skills; describe the evolution, characteristics and performance of Australia's digital games industry; describe the international environment in which Australia's digital games industry operates; and provide insights into the skilling of digital games workers in Australia and elsewhere. Due to a lack of recent reports and literature about the games industry workforce and the impact of the Global Financial Crisis on the industry, the study sourced numerous online articles published in the last couple of years.

Many of the findings from this study are already well known and/or similar to those identified in existing resources. Australia's games industry has a number of competitive advantages (e.g. low production costs, pockets of excellence, online gaming expertise, and cultural proximity to Western games market), as well as a number of challenges (staffing difficulties, low levels of IP generation, reliance on overseas companies, geographical remoteness, and lower salaries). It operates in an international environment experiencing massive changes in the types of games developed, the process of developing games, how companies generate revenue, player demographics, and the skills sets needed by workers. Despite some Government support for the industry, improvements to games courses, and increasing awareness of industry skills needs, Australia's games industry continues to experience issues that restrict the development of an internationally competitive workforce. Chapter 5 of this report includes proposed measures to address these issues, such as industry-driven courses, incentives for providers, organisations and funds dedicated to games education and research, and a demand-led higher education framework.

This consolidation study (Stage 1) has identified seven potential areas that industry, government, providers and/or researchers could investigate in more detail:

- ◆ Turning brain drain into brain gain and brain circulation to develop particular areas of expertise in Australia (such as online games) through joint Government and industry incentives designed to retain overseas talent, encourage Australian talent to gain experience overseas, and encourage Australian talent working overseas to return home.

- ◆ Exploring how Australia's games industry can prepare itself for the growing demand for online and wireless games, serious games and advergames.
- ◆ Assessing industry demand for graduates from games and games-related courses as well as course preferences by industry to ensure the education and training system is producing the right number of graduates in the right fields.
- ◆ Developing a nationally recognised on-the-job training program for students that is industry-endorsed, government-supported, and flexible enough to meet the needs of an individual games company/studio.
- ◆ Ensuring games courses equip students to work in other industries; and provide students in other disciplines (e.g. education, law and business) with access to relevant opportunities in the games industry, such as on-the-job training programs with serious games developers.
- ◆ Examining the feasibility of a one-stop shop that
 - a) provides information to prospective and current students, companies, and other stakeholders about games courses and research;
 - b) brokers and promotes on-the-job training opportunities;
 - c) provides advice on government support for the games industry;
 - d) develops relationships between companies, providers and government agencies;
 - e) shares information about industry needs and trends with relevant bodies in Australia; and/or
 - f) manages a games R&D programme.
- ◆ Ensuring frameworks for best-practice games studio culture and management include indicators relating to the skills sets necessary to produce innovative and original IP and provide advice on how these skills sets should be organised.

As stated in Chapter 2 of this report, the purpose of this study is to a) identify and analyse current and future skills needs and gaps in Australia's digital games industry in order to b) determine which occupations and skills sets require employment and training focus for the labour market. Stage 2 involves the development of a future skills strategy for Australia's games industry by drawing together key findings from this report, a scenario planning exercise, the Worker Survey, and responses to polls and blog questions to address these two aims.

The scenario planning exercise aims to develop a shared view about a) the possible scenarios for the future of the games industry; b) what these scenarios mean for the skills profile of games workers; and c) how best to equip workers with the necessary skills. See **Appendix 1: Methodology** for more information about the scenario planning exercise and tool.

The second report for this project, *A future skills strategy for Australia's digital games industry*, will include short-term and long-term solutions to address workforce development priorities and issues for three to four different scenarios of the state of the games industry in 2015.

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Appendix 1: Methodology

This appendix consists of the study's approach to data collection and analysis.

The *Working in Australia's Digital Games Industry* study consists of two stages:

- ◆ Stage 1: Consolidation study
- ◆ Stage 2: Future skills strategy

This report presents findings from Stage 1, which involved scanning for existing national and international resources for the games industry and digital content industries to identify resources most relevant to this study. The resources largely included literature, studies, policies, programs, and statistical data that inform the following four areas:

- ◆ Key concepts and definitions relating to the games industry and skills
- ◆ Evolution, characteristics and performance of Australia's digital games industry
- ◆ International environment in which Australia's digital games industry operates
- ◆ Skilling of digital games workers.

The search for resources as part of Stage 1 commenced in 2009 and continued until the release of this consolidation report in May 2011. The search for new resources will continue until the completion of Stage 2.

During Stage 1, workers from Australia's games industry responded to the Worker Survey; stakeholders responded to four polls on the [Working in Australia's Digital Games Industry](#) website; and stakeholders responded to blog questions posted on this site as well as on LinkedIn's GameDev group site. Some of the results from these activities are included in this report. The key findings from Stage 1 together with the findings from a scenario planning exercise will inform the development of a future skills strategy for Australia's games industry (Stage 2).

Worker Survey

The 56 workers who completed the Worker Survey provided insights into their employment experiences and intentions; industry recruitment practices; views about particular aspects of the games industry (e.g. state of the industry, wages and working conditions, ease in finding work); skills, education and training; and their demographic characteristics. The survey is located at the end of this appendix. The convenience sampling approach to attract workers to complete the survey involved:

- ◆ sending an initial email (May 2010) and a reminder email (June 2010) to each Australian member of the GamesDev group of LinkedIn (47 members in total), which proved to be the most effective data collection method
- ◆ GDAA emailing its members about the survey
- ◆ promoting the study's website (which included a link to the survey) on relevant websites e.g. CCI, GDAA, Creative Economy (Australian Policy Online).

Blog questions

Blog questions posted on this study's website and LinkedIn's GamesDev group site were an opportunity to:

- ◆ obtain current views about skills shortages and the effectiveness of games courses (two ongoing issues in the games industry). For example, *Right now, are there skills shortages in Australia's digital games industry?*
- ◆ gather opinions from stakeholders about industry strengths, weaknesses, threats and opportunities. For example, *Are there any other opportunities available to the games industry?* Stakeholders were already provided with the opportunities drawn from existing sources e.g. shift from hard core to family gamers; growth of the casual games market using many existing and new platforms; growth of the serious games market; digital distribution allowing developers and publishers to develop original IP at lower cost; and greater opportunities to work in virtual teams.
- ◆ start the scenario planning exercise by asking respondents to identify current and future workforce challenges as well as to share their thoughts about the games industry in 2015. For example, *What are the key issues, challenges and drivers affecting workers now and in the near future? What will the games industry be like in 2015?*

Poll results (as at 16 May 2011)

Stakeholders responded to four polls located on the study's website. See Table 12 for results for these polls:

- ◆ Skills shortages or not?
- ◆ Pick the top 3 weaknesses of the Australian games developers
- ◆ Pick the top 5 threats facing Australian games developers
- ◆ Effectiveness of games courses.

The review of existing resources together with responses to blog questions informed the content of the weaknesses and threats polls. As at 16 May 2011, the polls had attracted 2,082 votes in total. Votes for the poll on threats facing games developers (902) accounted for 43.3% of all votes (see Figure 23). The top three sites referring stakeholders to the polls on the study's website were <http://gdaa.com.au>, <http://linkedin.com>, and <http://cci.edu.au/>.

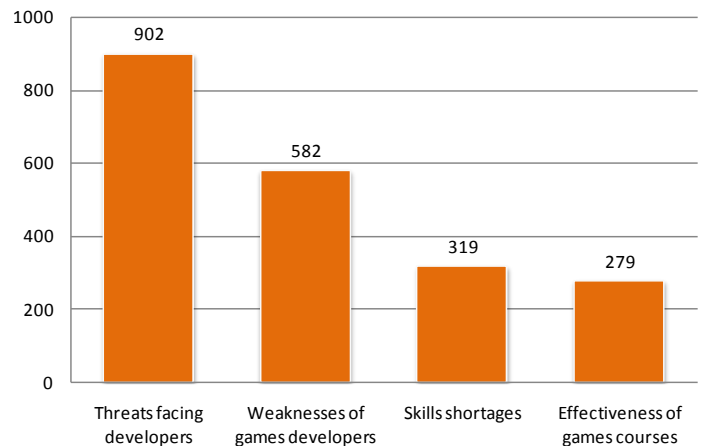


Figure 23. Number of responses to polls

Table 12. Poll results

		COUNT	PERCENT
Skills shortages or not?			
<input checked="" type="checkbox"/> Yes		265	83.07%
<input type="checkbox"/> No		32	10.03%
<input type="checkbox"/> Hard to say		22	6.9%
Total votes = 319			
		COUNT	PERCENT
Pick the top 3 WEAKNESSES of Australian games developers			
<input checked="" type="checkbox"/> Unattractive wages and conditions		175	30.07%
<input checked="" type="checkbox"/> Hard to recruit good talent		161	27.66%
<input checked="" type="checkbox"/> Inadequate knowledge of changing markets, consumer needs & new technology		115	19.76%
<input type="checkbox"/> Inadequate business awareness/business models/production methods		60	10.31%
<input type="checkbox"/> Reliance on large international publishers for work		46	7.9%
<input type="checkbox"/> Hard to maintain cash flow over the extended period of a project		11	1.89%
<input type="checkbox"/> Inability to own/protect IP		7	1.2%
<input type="checkbox"/> Other answer...		7	1.2%
Total votes = 582			

Pick the top 5 THREATS facing Australian games developers

- ☐ The Australian games industry has a weak international presence
- ☐ Uncertainty about recovery from the global economic downturn
- ☐ Traditional games are getting more expensive to produce
- ☐ Industry worldwide is dominated by a small number of large publishers
- ☐ Australia is too far away from the main publishers
- ☐ Greater outsourcing of work to countries with cheaper labour costs e.g. China
- ☐ Publishers demand services at a lower cost but with the same quality and delivered on-time
- ☐ Lack of Government incentives to support the development of the industry in Australia
- ☐ Ongoing skills shortages
- ☐ Education and training system is not producing industry-ready graduates
- ☐ Poor linkages between industry and education/training providers
- ☐ Lack of R&D in Australia that identifies new games features, markets, player groups, etc
- ☐ Inability of the industry worldwide to develop effective anti-piracy measures

Other:

Effectiveness of games courses?

- ☐ Highly effective
- ☐ Somewhat effective
- ☐ Neutral
- ☐ Somewhat ineffective
- ☐ Highly ineffective

	COUNT	PERCENT
Education and training system is not producing industry-ready graduates	164	18.18%
Ongoing skills shortages	155	17.18%
The Australian games industry has a weak international presence	153	16.96%
Lack of R&D in Australia that identifies new games features, markets, player groups, etc	148	16.41%
Traditional games are getting more expensive to produce	146	16.19%
Industry worldwide is dominated by a small number of large publishers	50	5.54%
Australia is too far away from the main publishers	37	4.1%
Lack of Government incentives to support the development of the industry in Australia	14	1.55%
Publishers demand services at a lower cost but with the same quality and delivered on-time	13	1.44%
Uncertainty about recovery from the global economic downturn	8	0.89%
Greater outsourcing of work to countries with cheaper labour costs e.g. China	7	0.78%
Poor linkages between industry and education/training providers	3	0.33%
Other answer...	3	0.33%
Inability of the industry worldwide to develop effective anti-piracy measures	1	0.11%

Total votes = 902

	COUNT	PERCENT
Highly ineffective	234	83.87%
Somewhat effective	18	6.45%
Somewhat ineffective	12	4.3%
Neutral	9	3.23%
Highly effective	6	2.15%

Total votes = 279

Stage 2: Future skills strategy (next report)

Stage 2 involves a scenario planning exercise to develop a future skills strategy for Australia's digital games industry that includes short-term and long-term solutions to address workforce development priorities and issues. Some solutions may be effective for one scenario but not effective for other scenarios. Workforce development priorities and issues experienced today may persist in one scenario but not in other scenarios.

Conway (2003) defined scenarios as "possible view[s] of the world describe[d] in narrative form (stories) that provide a context in which managers can make decisions" (p. 30). Scenarios represent alternatives rather than predictions (National Program for Sustainable Irrigation 2009). The Australian National Training Authority (2002) described the benefits of scenario planning as addressing uncertainty and a range of possible futures; enriching planning processes and outcomes; and engaging a variety of disparate stakeholders in sharing views of possible futures and appropriate positioning strategies (p. 5). The scenario planning exercise for this study aims to develop a shared view about a) the possible scenarios for the future of the games industry; b) what these scenarios mean for the skills profile of games workers; and c) how best to equip workers with the necessary skills.

Scenario planning uses a range of methods such as desk research, interviews with experts, focus groups, interviews, questionnaires, and case studies (Leney, Coles, Grollman and Vilu 2004, p. 43). Leney et al. (2004) stated that "scenarios work best when a wide range of stakeholders are involved and can claim ownership" (p. 35). Apart from using the method of desk research (findings are presented in this report), this study uses a number of methods to engage stakeholders in the scenario planning exercise. Stakeholders contribute to the study's scenario planning exercise by:

- ◆ answering the scenario planning questions in the Worker Survey and responding to polls and blog questions
- ◆ completing the scenario planning questionnaire in 2011
- ◆ providing feedback on the draft future skills strategy, which will include the draft scenarios.

The Worker Survey asked participants to indicate their interest in contributing to the study's scenario planning exercise. Of the 56 workers who completed the survey, 21 workers indicated they were interested in contributing to the exercise. Providers of games and games-related courses, State and national policymakers, and representatives from key industry associations will also be invited to participate in the exercise.

This study will follow the recommended scenario planning process, which typically consists of the following stages:

- ◆ *Step 1: Define the problem/identify the focal question*
- ◆ *Step 2: Conduct desktop research to identify relevant trends and drivers of change e.g. economic, social, technological, political, legal, and environmental.*

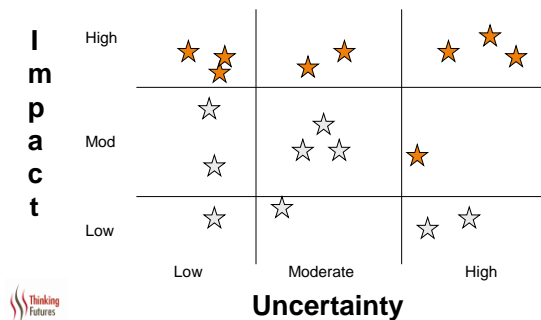
A key purpose of the consolidation study was to gather information on relevant trends and drivers of change in Australia's games industry. Relevant findings from the review of existing resources, Worker Survey, and responses to the polls and blog questions informed the development of the scenario planning tool, which is included in this appendix.

- ◆ *Step 3: Select and rank drivers of change by level of uncertainty and impact.*

Uncertainty is judged as 'low' (i.e. reasonably certain that drivers will continue in ways that are fairly well understood), 'high' (i.e. there are no clear ideas about the plausible ways a particular driver might go), or 'moderate' (somewhere in between). Conway (2003) suggested using the *Impact-Uncertainty Classification* tool to determine which drivers are for example, 'High Impact/Low Uncertainty' (which represent predetermined elements or trends, which should be present in every scenario); 'High impact/High Uncertainty' (critical uncertainty); and blue drivers (drivers that might be significant in the future). As shown in Figure 24, the critical scenario drivers (i.e. 'High Impact/High Uncertainty') sit in the top right hand corner of the matrix. All driving forces considered unimportant are discarded. However, low-probability, very-high impact drivers/events ('wild cards') that are potentially disruptive (negatively and/or positively) should be considered, such as the stock market collapse, terrorist attacks and natural disasters experienced in recent times.

The two drivers that are most uncertain and most critical in terms of impact are then used to build a *Scenario Matrix* (see Figure 25). Figure 26 shows how a matrix of this kind can lead to four scenarios for the emerging TV market, based on the critical scenario drivers of 'Choice and Control' (i.e. broadcaster vs. consumer) and 'Platform' (i.e. Pay TV vs. Free to View). An example of one of the scenarios is *My Media* where consumers choose what, when and where they view TV on free-to-view platforms (Decipher 2010).

Impact-Uncertainty Classification



Building the Scenario Matrix

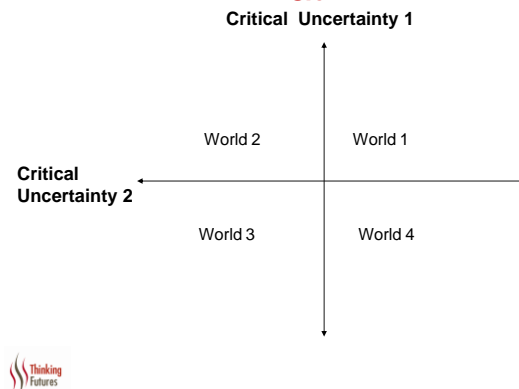


Figure 24. Impact-Uncertainty Classification Matrix

Figure 25. Building the Scenario Matrix

(Conway 2003)



Figure 26. Scenarios for the emerging TV market

(Decipher 2010)

- ◆ **Step 4:** Develop the scenarios. Although scenarios are normally at least 10 years into the future, this study is focussing on the period up to 2015 because of the rapid pace of change in technology and consumer markets in the games industry. Conway (2003) also labels scenarios as 'probable', 'preferable', 'plausible', 'possible', and 'impossible'. Any 'impossible' scenarios are ruled out.
- ◆ **Step 5:** Write up the draft scenarios as narratives, giving each a title that "describes the essence of your world, and that is memorable" (Conway 2003, p. 67), and present the scenarios to stakeholders to check for plausibility and consistency.
- ◆ **Step 6:** Modify, polish and present the final scenarios to stakeholders.

(O'Brien 2000; Leney; 2004; Conway 2003)

This study can learn from the Business Council of Australia's 2004 scenario report, *Change is Inevitable Progress is Not: Aspire Australia 2025*, that contains three scenarios that represent good examples of how to create and write up scenarios. Eighty (80) Australian opinion leaders, with a broad range of interests and disciplines, engaged in a debate to develop scenarios about the Australia's long-term future, including "the relationships that shape Australia's capacity to build security, prosperity and social harmony" (p. 7). The three scenarios reflect "Australia as a country surrounded by oceans ... and the role that the ocean plays in our thinking about our country, geographical position and our culture" (p. 7). Here is summary from the report of the final three scenarios:

- ◆ *Riding the Wave* explores the consequences of a breakdown in trust between people and institutions. It is a story about reform fatigue and complacency. In this scenario a loss of faith in institutions eventually undermines Australia's capacity to grow. A lack of long-term, focused investment and reform results in economic decline and social crises, ultimately leading to a re-examination of our political structures. In *Riding the Wave*, global prosperity is no guarantee of prosperity for Australia. Efficient and effective Government and trust between people and institutions are critical to building the capacity of the nation.
- ◆ *Stormy Seas* focuses on Australia's international relationships. It explores Australia's policy options in a future where there is a sustained decline in Asia Pacific stability and security. Regional instability challenges Australia's international and economic relations. Australians become more nationalistic, more cohesive – they are more tolerant towards difference within Australia, but at the same time cocooned in their view of the rest of the world. While it is stressed that this is only one possible story about how these relationships might evolve, the *Stormy Seas* scenario presents a difficult future for Australia.
- ◆ *Changing the Crew* examines the social dimension of change in Australia – in particular the potential value tensions within and between generations as baby boomers, who have dominated Australia's policies and values, are moving into retirement in unprecedented numbers. In *Changing the Crew*, a new generation of pioneers creates a sharper-edged Australia, resulting in friction with other generations. Australians are more strongly connected with the rest of the world than ever before, economically and culturally.

(Business Council of Australia 2004, p. 7)

Working in Australia's Digital Games Industry study: Scenario planning information and tools

The *Working in Australia's Digital Games Industry* study includes a scenario planning exercise to develop a future skills strategy for Australia's digital games industry that will propose short-term and long-term solutions to address workforce development priorities and issues. Some solutions may be effective for one scenario but not effective for other scenarios. Workforce development priorities and issues experienced today may persist in one scenario but not in other scenarios. Queensland University of Technology (QUT), the Australian Research Council Centre of Excellence for Creative Industries and Innovation (CCI), and the Games Developers' Association of Australia (GDAA), the peak Australian body for the interactive games industry, are supporting this study.

The research team requests your assistance because scenarios work best when a wide range of stakeholders are involved and can claim ownership. As a stakeholder, you will benefit by having a greater understanding of the future of the industry that can guide your decisions about how best to equip yourself for change. For this study, stakeholders contribute by:

- ◆ answering the scenario planning questions in the Worker Survey, and responding to blog questions and polls (this part of the study is finished)
- ◆ completing the scenario planning tool in 2011 (this is what we are asking you to do now; it should take you around 20 minutes to complete; and questions focus on your current and future games worlds and drivers of change in the industry)
- ◆ providing feedback on the draft future skills strategy, which will include the draft scenarios.

This study will follow the recommended scenario planning process, which consists of the following stages:

- ◆ Step 1: Define the problem/identify focal question
- ◆ Step 2: Conduct desktop research to identify relevant trends and drivers of change
- ◆ Step 3: Select and rank drivers of change by level of uncertainty and impact in order to identify critical scenario drivers
- ◆ Step 4: Develop the scenarios
- ◆ Step 5: Write up the draft scenarios as narratives, giving each a title that "describes the essence of your world, and that is memorable" (Conway 2003, p. 67), and present the scenarios to stakeholders to check for plausibility and consistency
- ◆ Step 6: Modify, polish and present the final scenarios to stakeholders.

You would participate in Steps 3 and 4 if you complete the scenario planning tool. If you indicate on the tool that you would like to participate in Step 5 (i.e. reviewing the draft scenarios), we will contact you again.

As an example of scenarios developed for another market, the figure below shows four scenarios for the emerging TV market, based on the critical scenario drivers of 'Choice and Control' (i.e. broadcaster vs. consumer) and 'Platform' (i.e. Pay TV vs. Free to View). In the scenario titled *My Media*, consumers choose what, when and where they view TV on free-to-view platforms (Decipher 2010).



Your participation in this exercise is voluntary. Your decision to participate will in no way impact upon your current or future relationship with QUT, CCI or GDAA. Because we do not ask for your name and contact details (unless you want to participate in Step 5 i.e. reviewing the draft scenarios), we will not be able to identify you. In this case, the completion of the tool is accepted as an indication of your consent to participate. If you do agree to participate, you can withdraw from participation at any time during the study without comment or penalty. However, if your response is anonymous (i.e. you do not provide your name), it will not be possible to withdraw after submitting the tool.

The only risk associated with your participation is unauthorised people accessing your responses. Your completed tool is protected and stored on QUT's on-campus infrastructure. Data collected is only accessible by the tool creator and IT administrators who are bound by the University's policies and procedures regarding the protection, privacy and confidentiality of data.

QUT is committed to researcher integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the scenario planning exercise you may contact the QUT Research Ethics Officer on ethicscontact@qut.edu.au or 07 3138 5123. The Research Ethics Officer is not connected with the exercise and can facilitate a resolution to your concern in an impartial manner.

Please contact Dr Sandra Haukka, Senior Research Fellow, CCI, s.haukka@qut.edu.au, 0422 119 755, if you require further information about the study.



SECTION 1: ABOUT YOU AS A STAKEHOLDER

1.1 What type of stakeholder are you? (pick the main type)

- ☐ Employer
 ☐ Worker/employee
 ☐ Teacher
 ☐ Government representative
☐ Industry association representative
 ☐ Student
 ☐ Other _____

1.2 Where are you located?

- ☐ QLD
 ☐ NSW
 ☐ VIC
 ☐ SA
 ☐ TAS
 ☐ WA
 ☐ ACT
 ☐ NT

1.3 How long have you been in the digital games industry as a stakeholder?

- ☐ < 2 years
 ☐ 2-5 years
 ☐ 6-10 years
 ☐ > 10 years

SECTION 2: DRIVERS OF CHANGE IN THE GAMES INDUSTRY

This section consists of two questions. The first question asks you to indicate your views about the level of certainty of particular drivers on Australia's digital games industry. The second question asks you to indicate your views about the impact of these drivers on the industry.

2.1 Please rate your level of certainty for the following drivers of change for Australia's digital games industry from 'highly uncertain' to 'highly certain'. In the case of global economic growth, as an example, if you are fairly uncertain about trends in global economic growth, you would probably rate your level of certainty for this driver as 'uncertain'.

	Highly uncertain (1)	Uncertain (2)	Neutral (3)	Certain (4)	Highly certain (5)	Unsure (6)
1 Global economic growth						
2 Australian economic growth						
3 New business models and revenue streams						
4 New competitors from emerging countries						
5 Changes in consumer demand, needs and demographics						
6 Wage levels and work conditions in Australia						
7 Level of demand for games workers in Australia						
8 Availability of a skilled workforce in Australia						
9 Australia's continued reliance on large international publishers for work						
10 Greater outsourcing of work to countries with cheaper labour costs						
11 Greater demand by publishers for services at a lower cost but with the same quality and delivered on-time or quicker						
12 Emerging markets e.g. online, serious, advergaming, exergaming						
13 Lower demand for traditional games						
14 Changing games platforms e.g. MMOs, game portals, mobile devices						
15 Opportunities created by digital distribution						
16 Opportunities created by cloud computing						
17 Changing work practices e.g. virtual teams						
18 Level of government support and incentives for industry development						
19 Quality of education and training provision for the games industry						

	Highly uncertain (1)	Uncertain (2)	Neutral (3)	Certain (4)	Highly certain (5)	Unsure (6)
20 Level of R&D funding for games industry research						
21 Quality of links between employers and education and training providers						
22 Games classifications						
23 Current and future skills requirements of workers						

2.2 Please rate the **level of impact** the following drivers of change have on the state of Australia's digital games industry from 'no impact' to 'very high impact'. In the case of global economic growth, as an example, if you believe global economic growth has a significant impact on the state of Australia's games industry you would probably rate the impact level for this driver as 'high'.

	No impact (1)	Low impact (2)	Neutral (3)	Medium impact (4)	High impact (5)	Unsure (6)
1 Global economic growth						
2 Australian economic growth						
3 New business models and revenue streams						
4 New competitors from emerging countries						
5 Changes in consumer demand, needs and demographics						
6 Wage levels and work conditions in Australia						
7 Level of demand for games workers in Australia						
8 Availability of a skilled workforce in Australia						
9 Australia's continued reliance on large international publishers for work						
10 Greater outsourcing of work to countries with cheaper labour costs						
11 Greater demand by publishers for services at a lower cost but with the same quality and delivered on-time or quicker						
12 Emerging markets e.g. online, serious, advergaming, exergaming						
13 Lower demand for traditional games						
14 Changing games platforms e.g. MMOs, game portals, mobile devices						
15 Opportunities created by digital distribution						
16 Opportunities created by cloud computing						
17 Changing work practices e.g. virtual teams						
18 Level of government support and incentives for industry development						
19 Quality of education and training provision for the games industry						
20 Level of R&D funding for games industry research						
21 Quality of links between employers and education and training providers						
22 Games classifications						
23 Current and future skills requirements of workers						

SECTION 3: YOUR CURRENT GAMES INDUSTRY WORLD

3.1 How did your world develop to a point that you are currently involved in Australia's digital games industry as a stakeholder? (Stakeholders include those working in the industry, providers of games and games-related courses, government representatives influencing/implementing policy relevant to the games industry, representatives of industry associations and other relevant bodies, and students). To answer this question, prepare a list of key events (e.g. career opportunities, education, networks) you think created your games industry world.

3.2 What has changed in your games industry world during the time you have been a part of it?

3.3 What are your existing gaps in knowledge/skills? If you believe you do not have any gaps, please go to question 3.5.

3.4 What do you need to address your skills gaps?

3.5 Imagine a title that describes the essence of your current games world and is memorable. What is your title?

SECTION 4: YOUR FUTURE GAMES INDUSTRY WORLD

4.1 Do you intend to leave the games industry in the next 12 months? If you answered NO or UNSURE, go to the next question (4.2). If you answered YES, please indicate below why you intend to leave and then go to Section 5: Other.

☐ Yes

☐ No

☐ Unsure

If you intend to leave the industry in the next 12 months, please explain why.

4.2 What does your future games industry world look like over the next five (5) years? Here are some questions to prompt your thoughts - Where will you work? What will you work on? What will affect your work? Who are your customers/markets? What could go wrong?

4.3 What skills do you need to achieve success in your future games industry world?

4.4 What is the likelihood that you will have the skills needed to work successfully in the industry over the next five (5) years?

- ☐ Highly unlikely
 ☐ Unlikely
 ☐ Neutral
 ☐ Likely
 ☐ Highly Likely

4.5 What will help you to acquire the necessary skills?

4.6 Question 3.5 asked you to imagine a title that describes your current games world. Will this title be the same in your future games industry? If yes, what is your new title?

SECTION 5: OTHER

5.1 If you have other comments about the current and future games industry, please write them here.

5.2 If you would like to comment on the draft scenarios, please provide your details below.

Name:

Email address:

Working in Australia's Digital Games Industry study: Worker Survey

Survey of Workers in Australia's Digital Games Industry

The Survey of Workers in Australia's Digital Games Industry is an important part of a project that is identifying and evaluating skills sets and occupations required for employment both currently and in the near future. The project is also measuring the extent, source and impact of skills gaps and shortages. Your input will help to address the lack of dedicated research on skilling in the industry.

Queensland University of Technology, the Australian Research Centre of Excellence for Creative Industries and Innovation, and the Games Developers' Association of Australia (GDAA) are supporting this project.

A key part of the project is surveying workers and employers in the industry, and consulting with other key stakeholders such as training providers, policymakers, and industry associations/bodies. As a worker in the industry, we invite you to participate in the Survey of Workers in Australia's Digital Games Industry. It should take you up to seven (7) minutes to complete.

Your participation in this project is voluntary. Your decision to participate will in no way impact upon your current or future relationship with QUT or project partners. Because we do not ask for your name and contact details on the survey (unless you want to receive information about research findings), we will not be able to identify you or your employer. In this case, the completion of the survey is accepted as an indication of your consent to participate. If you do agree to participate, you can withdraw from participation at any time during the project without comment or penalty.

Information provided in a survey is stored on QUT's on-campus infrastructure. Data collected and stored on the survey machine is only accessible by the survey creator and IT administrators. IT administrators are bound by the University's policies and procedures regarding the protection, privacy and confidentiality of data.

QUT is committed to researcher integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Officer on 3138 2340 or ethicscontact@qut.edu.au. The Research Ethics Officer is not connected with the project and can facilitate a resolution to your concern in an impartial manner.

If you have any general questions about this survey, please contact Sandra Haukka at s.haukka@qut.edu.au, 07 38611725, 0424415376.

We look forward to your participation.

EMPLOYMENT

1. What year did you first enter the workforce, regardless of industry?

Please use the blank space to write your answers.

Page 1

2. How many years have you worked in the digital games industry?

Please pick one of the answers below.

- ☐ < 2 years
- ☐ 2-5 years
- ☐ 6-10 years
- ☐ > 10 years
- ☐ Unsure

3. What is your current main occupation?

Please pick one of the answers below or add your own.

- ☐ Manager/executive director/CEO
- ☐ Executive producer
- ☐ Graphic artist
- ☐ Artist - interactive games
- ☐ Script writer
- ☐ Interactive games designer
- ☐ Software programmer
- ☐ Animator
- ☐ Product tester
- ☐ Instructional designer
- ☐ Clerical/admin worker

If other, please specify

4. Do you have a secondary occupation within or outside the games industry?

Please pick one of the answers below or add your own.

- ☐ Yes
- ☐ No

If yes, please specify

Page 2

5. How are you currently employed? (you may select more than one)

Please check all that apply and/or add your own variant.

- ☐ Self-employed/own business
- ☐ Freelance/project work
- ☐ Employed full-time
- ☐ Employment part-time
- ☐ Employed casually

If other, please specify

6. What year did you start working with your firm?

Please use the blank space to write your answers.

7. How long has your firm been operating for?

Please pick one of the answers below.

- ☐ < 2 years
- ☐ 2-5 years
- ☐ 6-10 years
- ☐ > 10 years
- ☐ Unsure

Page 3

8. How many workers does your firm employ?

Please pick one of the answers below.

- ☐ Sole trader (no workers/employees)
- ☐ < 5 workers
- ☐ 6-10 workers
- ☐ 11-20 workers
- ☐ 21-50 workers
- ☐ 51-100 workers
- ☐ 101-150 workers
- ☐ 151-200 workers
- ☐ >200 workers
- ☐ Unsure

9. What is your annual gross income?

Please pick one of the answers below.

- ☐ No income
- ☐ <\$20,000
- ☐ \$20,000-\$29,999
- ☐ \$30,000-\$39,999
- ☐ \$40,000-\$49,999
- ☐ \$50,000-\$59,999
- ☐ \$60,000-\$69,999
- ☐ \$70,000-\$79,999
- ☐ \$80,000-\$89,999
- ☐ \$90,000-\$99,999
- ☐ > \$100,000
- ☐ Prefer not to say
- ☐ Unsure

Page 4

10. How did you find your current job?

Please pick one of the answers below or add your own.

- ☐ Headhunted by employer
☐ Sent an unsolicited CV to employer
☐ Participated in an internship/work experience with employer
☐ Met employer through an industry network/contacts
☐ Recommended by someone/word-of-mouth
☐ Recruitment agency
☐ Online advertisement (e.g. game sites, Seek, etc.)
☐ Print media advertisement
☐ Educational institution
☐ Started own business/self-employed

If other, please specify

11. How difficult/easy was it to find your current job?

Please pick one of the answers below.

- ☐ Very difficult
☐ Difficult
☐ Neutral
☐ Easy
☐ Very easy

Page 5

12. How important were the following factors to your employer when they recruited you?

Please mark the corresponding circle - only one per line.

	Not important	Somewhat important	Neutral	Important	Very important	Unsure
Having creative talent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having the right qualifications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having the right job skills and work experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Located in the same city/town as employer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other factor(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Have you worked in other occupations (e.g. teacher, engineer, tradesperson):

Please fill in the answers in the table below (mark appropriate circles and squares and fill in the blank spaces).

	Yes	No	Unsure	If yes, what occupation(s)
in the last 12 months?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
in the last 5 years?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

14. Have you worked in other industries (e.g. health, finance, mining):

Please fill in the answers in the table below (mark appropriate circles and squares and fill in the blank spaces).

	Yes	No	Unsure	If yes, what occupation(s)
in the last 12 months?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
in the last 5 years?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

15. Have you worked in the games industry in:

Please fill in the answers in the table below (mark appropriate circles and squares and fill in the blank spaces).

	Yes	No	Unsure	If yes, where?
other States and territories?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
other countries?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Page 6

16. In the next 2 years, do you intend to work in the games industry:

Please fill in the answers in the table below (mark appropriate circles and squares and fill in the blank spaces).

	Yes	No	Unsure	If yes, where?
In other States and territories?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
In other countries?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

17. Are you a member of an industry association or professional body?

Please pick one of the answers below or add your own.

- ☐ Yes
☐ No

If yes, which association(s)?

18. To what extent do you agree/disagree with the following statements?

Please mark the corresponding circle - only one per line.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
18a) Employers are finding it hard to recruit skilled workers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18b) Wages and working conditions in the games industries are attractive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18c) Finding work in the games industry is easy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18d) People who could work in the games industry prefer to work in other industries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18e) The Australia Digital Games Industry is growing rapidly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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19. If your employer is finding it hard to recruit skilled workers (you answered Question 18a "agree" or "highly agree"), what particular occupations are they finding difficult to recruit?

Please use the blank space to write your answers.

Occupation 1

Occupation 2

Occupation 3

20. If you indicated that people are preferring to work in other industries (you answered Question 18d "agree" or "highly agree"), are there any particular occupations you are referring to?

Please use the blank space to write your answers.

Occupation 1

Occupation 2

Occupation 3

EDUCATION, SKILLS AND TRAINING

Page 8

21. What is your highest level of study/qualification?

Please pick one of the answers below or add your own.

- ☐ Below secondary school
☐ Secondary school
☐ Certificate (VET/TAFE/private college)
☐ Diploma/Advanced Diploma (VET/TAFE/private college)
☐ Undergraduate/Bachelor degree (university)
☐ Postgraduate Certificate/Diploma (university)
☐ Masters degree
☐ PhD

If other, please specify

22. What is your main field of post-school study?

Please pick one of the answers below or add your own.

- ☐ Creative Industries
☐ Natural and Physical Sciences
☐ Information Technology
☐ Engineering and Related Technologies
☐ Architecture and Building
☐ Agriculture, Environmental and Related Studies
☐ Health
☐ Education
☐ Society and Culture
☐ Management and Commerce
☐ Food, Hospitality and Personal Services
☐ Mixed-field Programs
☐ Unsure

If other, please specify

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23. If your field of study was the Creative Industries, what did you specialise in?

Please pick one of the answers below or add your own.

- ☐ Advertising & Marketing
☐ Architecture, Design & Visual Arts
☐ Film, TV & Radio
☐ Music & Performing Arts
☐ Publishing
☐ Software & Interactive Content
☐ Liberal Arts

If other, please specify

24. How would you rate your ability in the following generic skill areas:

Please mark the corresponding circle - only one per line.

	No skills	Low	Neutral	Good	Excellent
Communication skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team work skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Problem solving skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Initiative and enterprise skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planning and organising skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self-management skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. How often have you participated in work-related education and training in the last 12 months?

Please pick one of the answers below.

- ☐ Not at all
☐ Rarely
☐ Sometimes
☐ Often
☐ Very often

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26. What type(s) of work-related education and training did you receive? e.g. induction training, programming, software courses, etc.

Please write your answer in the space below.

.....

.....

.....

27. Was this workplace-related education and training:

Please fill in the answers in the table below (mark appropriate circles and squares and fill in the blank spaces).

	Yes	No	Unsure
self-funded?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
employer-funded?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
undertaken externally?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
undertaken internally/in-house	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. Overall, how effective was this work-related education and training in improving your ability to do your job?

Please pick one of the answers below.

- ☐ Highly ineffective
☐ Somewhat ineffective
☐ Neutral
☐ Somewhat effective
☐ Highly effective

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29. To what extent do you agree/disagree with the following statements?

Please mark the corresponding circle - only one per line.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
25a) Keeping up with industry developments (e.g. new technology, markets) is difficult	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25b) Games companies are committed to upskilling their workers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25c) Many workers are overqualified for their jobs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25d) Many workers are underqualified for their jobs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25e) Most workers have the right skills and experience for their jobs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25f) Most workers need more education and training to do their job better	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25g) I am overqualified for my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25h) I am underqualified for my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25i) I have the right skills and experience for my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25j) I need more education and training to do my job better	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

30. How effective are education and training institutions in producing graduates with the right skills and knowledge to work in the digital games industry?

Please pick one of the answers below.

- ☐ Highly ineffective
☐ Somewhat ineffective
☐ Neutral
☐ Somewhat effective
☐ Very effective

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31. What new skills and knowledge, if any, will you need to work in the games industry in the future?*Please write your answer in the space below.*

32. Can you suggest ways to improve the current education and training courses to better equip graduates to work in the games industry now and in the future?*Please write your answer in the space below.*

PERSONAL INFORMATION**33. Gender***Please pick one of the answers below.*

- ☐ Male
- ☐ Female

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34. Age group*Please pick one of the answers below.*

- ☐ < 20 years
- ☐ 20-24 years
- ☐ 25-29 years
- ☐ 30-34 years
- ☐ 35-44 years
- ☐ 45-54 years
- ☐ 55-64 years
- ☐ 65 years or older

35. Postcode*Please use the blank space to write your answers.*

36. Where are you located?*Please pick one of the answers below.*

- ☐ Metropolitan area
- ☐ Regional area
- ☐ Rural area
- ☐ Remote area

37. Place of birth*Please pick one of the answers below or add your own.*

- ☐ Australia
- ☐ Overseas

If overseas, please specify country

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38. Marital status*Please pick one of the answers below or add your own.*

- ☐ Married
- ☐ Partnered but not married
- ☐ Separated
- ☐ Divorced
- ☐ Single

If other, please specify

THANK YOU FOR COMPLETING THE SURVEY**39. Please add any final comments about work, skills, and education and training in the games industry.***Please write your answer in the space below.*

40. If you would like to receive a summary of the findings, please provide your contact details.*Please use the blank space to write your answers.*

Name

Organisation

Email address

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41. Marital status*Please pick one of the answers below or add your own.*

- ☐ Married
- ☐ Partnered but not married
- ☐ Separated
- ☐ Divorced
- ☐ Single

If other, please specify

42. Would you like to participate further in the scenario planning exercise? This would involve commenting on other scenarios, helping to narrow down the number of scenarios, and responding to detailed descriptions of the three best scenarios. If yes, provide your contact details below.*Please pick one of the answers below.*

- ☐ Yes
- ☐ No

43. Would like to receive a summary of the survey findings? If yes, please provide your contact details below.*Please pick one of the answers below.*

- ☐ Yes
- ☐ No

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44. Contact details

Please use the blank space to write your answers.

First name

Surname

Email address

Phone number

45. Any final comments about work, skills, and education and training in the digital games industry?

Please write your answer in the space below.

THANK YOU FOR COMPLETING THE SURVEY

Appendix 2: Serious Games Taxonomy

This appendix consists of the Serious Games Taxonomy designed by Sawyer & Smith (2008). The Taxonomy shows the different genres of games and sectors interested in particular genres.

SECTORS		GENRES					
	Games for Health	Advergames	Games for Training	Games for Education	Games for Science and Research	Production	Games as Work
Government and NGO	Public health education & mass casualty response	Political games	Employee training	Inform public	Data collection/ planning	Strategic & policy planning	Public diplomacy, opinion research
Defence	Rehab & wellness	Recruitment & propaganda	Soldier support training	School house education	War games & planning	War planning & weapons research	Command & control
Healthcare	Cybertherapy/ exergaming	Public health policy & social awareness campaigns	Training games for health professionals	Games for patients	Visualization/ epidemiology	Biotech manufacturing & design	Public health response planning & logistics
Marketing and Communications	Advertising treatment	Advertising, marketing with games, product placement	Product use	Product information	Opinion research	Machinima	Opinion research
Education	Inform about disease/risks	Social issue games	Train teachers/train workforce skills	Learning	Corporate science & recruitment	Documentary	Teaching distance learning
Corporate	Employee health information & wellness	Customer education & awareness	Employee training	Continuing education & certification	Advertising/ visualization	Strategic planning	Command & control
Industry	Occupational safety	Sales & recruitment	Employee training	Workforce education	Process, optimization, simulation	Nano/bio-Tech design	Command & control

(Sawyer & Smith 2008)

Appendix 3: Business models for the games industry

This appendix consists of definitions of 29 business models for the games industry by David Perry.

- ◆ *Retail (bricks & mortar)*: Selling boxed product at places like EBGames, Gamestop or Virgin Megastore. This also includes mom & pop stores, hardcore specialist gamer shops, and online retailers like Amazon.com that ship the product to your door. The gap in this market is "same day" physical delivery of games too big to download or 1st party titles (basically combining online & bricks and mortar in one solution.) The future of this space is pre-paid cards as the consoles will (in the future) go online only, distributing everything directly to the consumer, so retail (to make it worth selling the hardware) will need a cut of the software sales. Hence prepaid cards. The Gamestop tactic of re-selling USED games (to avoid paying for new product) will finally be over. To drive users to retail, the making of special "enhanced" versions just for their retail chain is a common practice.
- ◆ *Digital Distribution*: Direct download, direct to consumer, like the Steam service from Valve Software, the PlayStation Store or Xbox Live Arcade from Microsoft. This also technically includes "unlocking" access to a game already on a service, like the faux install process on Facebook (however the player would have to pay to do this unlock.)
- ◆ *In-Game Advertising*: Either obvious billboards or branded items in the game world, or subtle product placement (certain clothing, sunglasses or vehicles like Gaia Online), or built into story elements (like the hero's girlfriend works for a Neutrogena). Companies like IGA, Massive, Game Jacket, Mochi Media, Google, VideoEgg etc.
- ◆ *Around-Game Advertising*: Basically, making money from banner & skyscraper adverts that circle the gameplay window. This is common on flash game aggregator sites, they use services like Google, Commission Junction, personal affiliate deals etc. The revenue comes from CPM (cost per thousand views), CPC (cost per click), CPA (cost per acquisition of a player), CPP (cost for a "real" player who really plays for a certain time, or to a certain level).
- ◆ *Pay Finder's Fee from First Dollar*: This allows you to pay much higher finder's fees with no risk. Like offering (as the finder's fee), the first \$25 that comes in from any player they find. You balance the fee to a sensible percentage of the average income you get from players. We [Acclaim] get around \$70 per paying player, so this seems reasonable.
- ◆ *Advertgames*: The whole experience is an advert, common on movie websites, can also be big like America's Army or the Burger King games on Xbox 360. I did one of the first of these called "Cool Spot" for 7-UP. The advertiser helps fund the game and depending on the deal, that determines who earns cash out of the revenue. Your reputation will impact this equation.
- ◆ *"Try Before you Buy"/Trialware/Shareware/Demoware/Timedware*: This is letting you play crippled, shortened, or restricted time versions of a game for free, while trying to up-sell the full version. This is a real balancing act as too much in the demo can kill any hope of future sales. Xbox Live has been experimenting with this concept, they seem to have hit the sweet spot by giving one playable level and then giving a big reveal (like there's a giant boss monster around the corner) then they say "Buy the full version to continue!". That's basically the 'cliff-hanger' trick, and just like TV it works.
- ◆ *Episodic Entertainment*: Borrowing from the TV model, you either buy the episodes in a serial fashion as they become available, you can pay for all episodes unlocked for a period of time, or they are sold as expansion packs.
- ◆ *Skill-Based Progressive Jackpots*: Players buy a ticket to enter into a tournament. This generates a progressive jackpot and winner who reaches a certain (winner) status wins the jackpot. You keep a percentage of the jackpots. The game must be skill based.
- ◆ *Velvet Rope or Member's Club*: The user pays for VIP access. They get special privileges and access to special areas on your site or in your game. They sometimes get special access to new product before anyone else etc. Basically the more interesting perks you give, the more likely people will want it.
- ◆ *Subscription Model*: Like World of Warcraft or Conan, paid monthly, usually by credit card or automatic debit payment. It's sometimes coupled with a retail purchase to get the install files/manual. Commonly players set up the credit card payments and don't stop them, as they want to keep the game 'available' or keep their characters alive that they've worked so hard to create. It's pretty great to get a subscription from people that don't even play, so expect more people to design games were they will clearly kill your characters if you stop paying. Not good for players, but it's on the list as it's a monetization method.
- ◆ *Microtransactions*: Small, impulse driven up selling, for vanity, saving time, better communications, leveling up faster etc. These are generally paid for using virtual points (earned in the game) or the points being bought by the player for real money. A new trend is using Friends to buy these items, where the item just costs you inviting a friend to the game, or an amazing item costs you inviting all your friends to the game. Another trend is to sell consumable items like actually selling the bullets you fire, or buying gas for the car you race, however this really grays the "free to play" line.
- ◆ *Sponsored Games/Donationware*: Serious games, games for good, charity games. These are the games that are somehow helping society, so could be paid for by a philanthropist, or by a charity or non-profit, or by player donations. www.onebiggame.org is an example.

- ◆ *Pay per play/Pay as you go/Pay for Time:* Like the old arcade machine or pinball system, you only pay for what you need, for a pre-set number of lives, or as long as you can last. Also used in Internet Cafes and game parlours. This model could be used for game time online as well.
- ◆ *Player to Player trading of Virtual Items:* Letting players trade land, property, characters, items, also by auctions. You keep a cut of all the money exchanged. You also keep the transactions safe for the player (they don't have to go to the gold farmers or risk the black market for characters). Some games let the players cash this money out of the game, so it can become a full time job, but is also a major fraud generator (they use fake credit cards, buy things, trade things, sell for cash, cash out).
- ◆ *Foreign Distribution Deals:* Like the movie industry, where you need funding, so you pre-sell your foreign distribution rights in advance, then use that money to fund the project in the countries you care about the most. www.gameinvestors.com will be helping people do this.
- ◆ *Sell Access to your Players:* Like lead generation, special offers etc., this is where you monetize your user database by inserting special offers, or personal profile questions into the registration loop. Like when you register, you're asked if you would fill out a profile in return for virtual points. This is then paid for by an external agency who collects the data live. Value is equal to how exclusive the data is, how detailed (revealing), and how fresh. The agency would generally give you the questions and the capture code.
- ◆ *Freeware:* Get lots of users. It's not a plan to make money, but then again, if you make something that's very compelling you can expect offers to acquire your software, company or technology.
- ◆ *Loss Leader:* Focus on your real goal, meaning you sell the game far too cheap. There's clearly too much value for money, like the PS3 Hardware strategy. You use the passionate following to your free game to help sell something else, like a Toy, TV or movie deal, and that's where the real money is that you were focused on.
- ◆ *Peripheral Enticement:* The game cannot function without a piece of equipment, so it's really a way to make you money on the hardware. Gym equipment is a good example, like the virtual bike or rowing games, you tease them with the software into a very expensive purchase.
- ◆ *Player to Player Wagering:* They place wagers before they go head to head. The winner keeps the pot and you keep a percentage of every pot. The games they play must be skill-based games. Gambling virtual items is another technique, where they buy/earn/trade virtual items, then bet them on maybe a 1-on-1 basketball game, the winner keeps the items. You made your money selling the items to them in the first place.
- ◆ *User Generated Content:* Letting users make endless new content. They can sell it to each other, or sell access to it, or get people to pay for time spent playing it, for points they can turn into cash (like IMVU), and you keep a cut of all sales.
- ◆ *Pay for Storage Space:* On a server to save progress, stats, game data etc. As an example, this can be used for Karaoke games where you pay to store your library of songs. Or at least you think you do, even though you are technically just making virtual storage space for your songs.
- ◆ *Pay for Private Game Server:* Where your friends come to play, like renting multi-player servers, or giving your friends a maximum quality experience. This is more for the hardcore First Person Shooter multi-player crowd.
- ◆ *Rental:* Stores like Blockbuster, or online like Gamefly. The old rental paradigm meant trying to design the game so it couldn't be played through within one rental period. These days with the Netflix/Gamefly Model, it doesn't matter anymore.
- ◆ *Licensing Access:* Like signing a deal with a chain of cyber cafes to unlock your game for their users. Or using your game as a part of a TV show. Or letting a corporation use your brand in their advertising such as McDonald's *Line Rider* commercial.
- ◆ *Selling Branded Items from your site:* Using a service like Cafepress where you need to work hard on your identity to make this interesting for people to wear. For example, see *Gamer Vixens*.
- ◆ *Pre-Sell the Game to the Players:* This model lets your fans actually fund the development of the title. For example, they pre-pay \$5 in advance for a \$50 game. They also get to see it get developed and get to provide feedback. When the game is launched, they get it for free as they already paid the \$5 advance. Clearly, you have to either have a reputation or a very hot idea to generate enough interest in advance, but once you get on a roll, this can work.
- ◆ *Buy Something, get the game for Free:* This is the Trialpay model, where the player buys something they want like a subscription to Gamefly. Then Gamefly gives Trialpay a nice fat fee. From that fee, you get paid, and Trialpay gets paid. So by signing up to Gamefly, they get their service and they also get your game (technically) for free.

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Appendix 4: Country performance ratings for the games industry, 2007

This appendix consists of UK Trade & Investment's justifications for the maturity, innovation, funding access, growth potential, and overall competitiveness ratings for the games industry in Australia, Canada, France, South Korea, Singapore, United States, and the United Kingdom. **Scores are out of 10.**

Rating type	Score	Justification
AUSTRALIA		
Maturity rating	4	Despite its age, the sector is small and slow growing, creates few AAA IPs, and is largely license-based
Innovation rating	3	Low ability to create new IP, relatively small numbers of AA IP created, and little IP origination or ownership
Funding access rating	5	Reasonable access to state-level assistance, but non-government funding is poor, and government assistance very low
Growth potential rating	5	Reasonable graduate levels, low salary levels but poor funding access and high developer mortality
Overall competitiveness rating	4.25	A niche player likely to remain so
CANADA		
Maturity rating	7	Strong on IP, range of skills and quality of games, medium on retail market size, poor on publishers
Innovation rating	8	Strong across the board, particularly in next generation console games
Funding access rating	8	Good government assistance but lacks the range, depth and trade capital of the US capital markets
Growth potential rating	8	Strong on retail growth potential, IP creation skills, access to markets, weaker on developer mortality
Overall competitiveness rating	7.75	World-beating studios and large subsidies make this a very popular location for new publishers' studios
FRANCE		
Maturity rating	6	Good age, retail market size and range of skills, medium number of staff, lower on studio numbers
Innovation rating	6	Good ability to create IP, medium on AAA titles, but strong IP is relatively thin on the ground
Funding access rating	6	Good access to public funds, medium access to non-government funds, but French studios are rarely sold at high values
Growth potential rating	4	High studio mortality, low student numbers, high overheads, good retail potential & start-up assistance
Overall competitiveness rating	5.5	Great publishers, weaker developers, state aid in abundance but too inward focused in a global market
SINGAPORE		
Maturity rating	2	Negligible retail market, almost no developers and only a handful of publishers, poor skills base and no IP
Innovation rating	2	Almost no original IP has been created, and a lack of skills outside mobile and casual games
Funding access rating	7	Good access to non-government and public assistance, and frequent promotion to overseas companies
Growth potential rating	2	High developer mortality rates, low retail growth, low IP creation, small sector and few games graduates
Overall competitiveness rating	3.25	Likely to remain little more than a hosting centre, bypassed en route to major Asian markets

Rating type	Score	Justification
SOUTH KOREA		
Maturity rating	6	Good on market size, number of studios, weaker on skills and ability to create global IP
Innovation rating	6	Strong on network technology and commercial model innovation, weaker on new game IP
Funding access rating	6	Strong levels of trade capital, medium levels of public funds, low levels of nongovernment capital and M&A activity
Growth potential rating	5	Market saturation, low levels of students and lower IP innovation balanced by large cash stockpiles of firms
Overall competitiveness rating	5.75	The market leader in Asia for online games, but few global games companies have/ would be located there
UNITED KINGDOM		
Maturity rating	9	Broad, deep experience, strong skills in creative and technical roles, many AAA titles, many robust studios
Innovation rating	9	Strong track record and creativity across genres and platforms, many examples of boundary-breaking games
Funding access rating	6	A reasonable level of trade capital flows into U.K., other capital has become sparse, governmental support is low
Growth potential rating	6	Developer numbers stable, start-up funding low, student numbers tolerable, high costs favour overseas
Overall competitiveness rating	7.5	Resting on laurels and facing stiff competition, but not under threat of extinction, some opportunities still exist, but IP creation is in decline
UNITED STATES		
Maturity rating	10	High scores on age of industry, range of skills, number of games staff, range of AAA games across genres
Innovation rating	8	High on new software, delivery platforms, technology and availability of funding for new games concepts, medium on new hardware
Funding access rating	9	Low-level access to federal government assistance but good levels of access to state assistance. Very high and increasing levels of investment and trade capital for games companies from US companies which is unparalleled globally
Growth potential rating	7	High numbers of graduates, very strong on retail's potential to support new games companies; however high resource/infrastructure costs, and high market penetration will hamper industry growth
Overall competitiveness rating	8.5	The place to be headquartered but development is slowly moving outside USA

(UK Trade & Investment 2007)

Appendix 5: SWOT analysis for the games industry by country, 2007

This appendix consists of UK Trade & Investment's SWOT analysis of the games industry in Australia, Canada, France, South Korea, Singapore, United States, and the United Kingdom.

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
AUSTRALIA <ul style="list-style-type: none"> ▪ Relatively experienced if small kernel of development talent ▪ A couple of super-developers outscale most other companies ▪ Low costs vs. global competition plus native English speakers ▪ Online gaming specialty, with links being forged with Korea and China ▪ Good levels of State government assistance have protected the industry from industry down-cycle, nurturing several independents ▪ Games clusters are co-located with other media, facilitating crossover hits ▪ Staff levels growing healthily 	<ul style="list-style-type: none"> ▪ Small-scale market that has grown slowly ▪ Work for hire with low/no revenue sharing predominates ▪ Low levels of access to non-government funding ▪ Geographically remote from U.S. and Europe but no major links with neighbour Japan ▪ Time frame differences can be difficult ▪ Low levels of world-class IP generated to date ▪ Low level of domestic retail market leaves studios reliant on overseas companies ▪ A number of publishers in Australia operate only sales and marketing outfits, not studios ▪ Lack of experienced staff forces developers to recruit overseas, a difficult, lengthy and expensive process 	<ul style="list-style-type: none"> ▪ Growing experience, low cost base and cultural proximity to major Western games markets sees the sector continue to grow healthily ▪ Rise in numbers of games-specific graduates maintains healthy flow of talent into industry ▪ Proximity to Korea and China sees Australian companies develop product for these growing markets ▪ A few super-developers create pockets of excellence, thus slowly spreading innovation, new IP creation and best practice 	<ul style="list-style-type: none"> ▪ Stasis – the Australian industry simply tracks the growth of the industry as it enters the up-cycle of the next generation of consoles, but no faster ▪ Independent studios struggle to find financing and most growth is found in publisher-owned studios, leading to a further contraction of the independent sector and a reduction in Australia's ability to create and retain new IP ▪ Loss of senior non-Australian staff returning home
CANADA <ul style="list-style-type: none"> ▪ Fastest growing games development territory in the world, with the most valuable individual studio – EA Burnaby in British Columbia ▪ World-class generator of new IP (esp. console IP), leading to several prominent acquisitions ▪ Lower salary and overhead costs attract US publishers ▪ Generous provincial support available in Montreal, which has siphoned experienced staff from France ▪ Location (and language) gives nearshore benefits for US firms such as cultural proximity 	<ul style="list-style-type: none"> ▪ Lack of domestic publishers means IP (and thus profit) flight is endemic ▪ Most of the best studios are now permanently in US/French hands ▪ Most of the best graduates are subsumed into major publisher studios, potentially damaging independent sector ▪ The independent sector has suffered high mortality levels since 2000 and concerns persist about a two-tier industry ▪ Québec Province's aggressive subsidies for games have triggered defensive responses from other territories, especially the most threatened – France 	<ul style="list-style-type: none"> ▪ Canada's position as location to some of the finest studios will grow as ▪ Publishers invest heavily in their wholly-owned studios ▪ Asian publishers start or acquire studios in Canada ▪ With better funding some IP rights may be retained, but the US\$ is strong ▪ Canada's games service and technology industry will continue to prosper ▪ Massive publisher-owned studios train staff who then leave to start up independent studios 	<ul style="list-style-type: none"> ▪ Continued loss of IP and profits to foreign-owned publishers ▪ Québec's French games immigrants will eventually return to France, but probably not before their benefit has been felt ▪ As the best staff and graduates land neatly in publishers' hands, Canada's independent sector may suffer ▪ Publisher-owned studios retain staff who might have left to start up independent studios ▪ Publishers may be impacted by loss of staff to start-ups incentivised by healthy public funding and assistance

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
FRANCE <ul style="list-style-type: none"> ▪ Strong publisher base with great portfolios, powerful lobbying ability, and strong acquisition activity (mostly outside France) ▪ Medium-sized development community with good IP creation skills ▪ Wide access to multifaceted national and local government aid which has helped over 100 projects since 2000, ensuring survival of many independent developers ▪ Loud support from the highest levels of the French government for this sector 	<ul style="list-style-type: none"> ▪ Rigidity of French employment laws ▪ Labour costs are high ▪ Drastic loss of development staff to Canada (nearly half of total French development staff) ▪ Aid packages are generally encouraging for French companies only, rather than global companies ▪ Levels of bureaucracy are high and bureaucrats may interfere with decisions on game types ▪ Recent decimation of the independent development sector ▪ France underperforms in terms of numbers and values of studios sold ▪ French development has a reputation for creating unique but commercially weak product ▪ Non-Anglophone country 	<ul style="list-style-type: none"> ▪ French companies will probably benefit from substantial cultural subsidies ▪ New IP will continue to flourish thanks to start-up and prototype funds which will continue to allow independent sector to bounce back ▪ Growing importance of Europe in global market ▪ Government may tempt major publishers back into France with subsidies 	<ul style="list-style-type: none"> ▪ Continued loss of development jobs to Canada and other lower cost, less restrictive markets seems inevitable ▪ Studios will continue to find it hard to raise non-government finance, especially following the high-profile failure of so many French games companies ▪ Studios may also find their hands tied by conditional government assistance ▪ State aid only delays gradual decline of sector
SOUTH KOREA <ul style="list-style-type: none"> ▪ Scale of developer/publishers with broad revenue base ▪ Its games dominate online games market across Asia, particularly Japan and China ▪ Large, high-penetration online market fuels highly profitable games companies ▪ Online delivery and service focus goes beyond “fire-and-forget” games development found in the west ▪ Korea leads the world in innovation in commercial models ▪ Cash-rich companies investing in USA and U.K. studios to counter deficit in global IP ▪ Massive growth in domestic games market driven by new online games 	<ul style="list-style-type: none"> ▪ Saturated domestic market with limited console sector ▪ East-west cultural barrier across which few Korean games have successfully crossed ▪ Seen by the global industry as a black box, thus poorly understood and underestimated ▪ Acknowledged lack in games design innovation and global IP ▪ IPR loss of Korean games through piracy in China; Chinese firms benefit through copying ▪ Poor IPR protection ▪ Much larger staffing levels are found in Korean firms than in other studios, due to lower costs 	<ul style="list-style-type: none"> ▪ Continued expansion into US and Europe via partnerships, JVs and acquisitions ▪ Continued exploration of new commercial models ▪ Gradual drop in control of Chinese market offset by massive growth in ▪ Chinese gaming and other emerging Asian markets 	<ul style="list-style-type: none"> ▪ China will inevitably begin to produce quality games of its own design, reducing Korea's control of Chinese market ▪ Domestic development market may have peaked, along with games sales ▪ Scale of companies can be reduced, leading to contraction in market

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
SINGAPORE <ul style="list-style-type: none"> ▪ Good government aid packages encourage start-ups in the games sector ▪ Good ties to local and international universities may generate technology ▪ IP in the medium term ▪ Relatively low salaries versus global norm (but high for Asia) ▪ Strong network infrastructure, good mobile penetration and IT skills growing ▪ Some success in attracting publishers and a few Japanese developers to locate there ▪ Multilingual, multi-cultural city state 	<ul style="list-style-type: none"> ▪ Almost no experienced development talent ▪ No IP has originated from Singapore ▪ High failure rate of developers ▪ Retail market is small and development community is not self-sustaining ▪ Proximity to piracy-prone Malaysia causes IPR protection issues, despite government assurances ▪ Singapore has highest developer salaries in South East Asia ▪ Has been sidelined in Asian games development growth ▪ Tiny population 	<ul style="list-style-type: none"> ▪ Growth of online opportunities ▪ Natural hub for high tech South-East Asian businesses, possibly for regional headquarters of global games businesses 	<ul style="list-style-type: none"> ▪ Has not and may (well) not gain critical mass in creating IP and may persist as simply a provider of hosting and networking services ▪ Singapore is bypassed in favour of Asian hot-spots such as Shanghai, Seoul or Hong Kong
UNITED STATES <ul style="list-style-type: none"> ▪ Many market-leading games IPs have been developed in the U.S. ▪ Unparalleled experience in games development ▪ Location of many of the world's major publishing companies and many world class developers ▪ Healthy market for games financing with a number of state tax schemes ▪ Largest global retail market sustains many more strata of games companies ▪ Smooth path between universities and commerce allows commercialisation of new technology ▪ Rising number of games graduates and growing industry staff numbers sustains innovation levels ▪ Strength of complementary indigenous media industries (film & television production, music, publishing, internet) provides access to excellent source of non-games IP 	<ul style="list-style-type: none"> ▪ High staff costs in most states, particularly around oldest development clusters ▪ Medium-high infrastructure costs ▪ Only one of the three largest hardware manufacturers is based there ▪ Often inward-looking culturally, less effective at understanding global audiences and need for localised content in an increasingly globalised industry ▪ Slower adoption of outsourcing as methodology than Europe, leading to slower adoption of price control mechanisms, impacting publisher profitability ▪ Some degree of development inefficiency found in major studios (blank cheque mentality) ▪ Largest US publishers often accused of stifling innovation by risk aversion and favouring franchises – one size fits all ▪ Slower adoption of mobile games 	<ul style="list-style-type: none"> ▪ Continued production of world-class games expected ▪ Rich cross-over between other media, particularly those located near games clusters, is expected to continue ▪ Massive retail market allows the survival of higher proportion of independent developers ▪ Continual refreshment of the games paradigm by developers sustains innovation at good levels ▪ Growth of the retail market to encompass new categories of player 	<ul style="list-style-type: none"> ▪ Rising cost of games staff continues to favour near-shoring games development to Canada and soon to Latin America, and to culturally proximate India ▪ Slower movement of Microsoft and others into mass-market gaming may allow foreign companies (Nintendo, Sony) to harvest new gaming demographics

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
<p>UNITED KINGDOM</p> <ul style="list-style-type: none"> ▪ Creative and technical talent is among the strongest worldwide, and companies continue to innovate on new platforms ▪ Breadth of experience covers all platforms, attracting large publisher studios and work for hire for platform specialists ▪ Historical U.K. companies have created world-class AAA IP across all genres ▪ The wide range and number of independent developers (half the number in Europe) is balanced by massive studios run by foreign companies like EA, Sony and Take 2 ▪ Strong technical ability has seen industry-leading tools and middleware originate in U.K. ▪ U.K. companies were early adopters of outsourcing to cheaper territories ▪ A winnowing of developers has seen stronger, better run companies survive and thrive ▪ A multitude of acquisitions has seen the U.K. as a premier location for publishers looking for experienced teams ▪ Good base of technology innovation has seen a number of leading technology IPs originated in the U.K. ▪ Native English-speaking country with close cultural proximity to the U.S. ▪ Liberal employment environment and access to EU market 	<ul style="list-style-type: none"> ▪ Lack of indigenous publishers with global scale ▪ Lack of independent AAA IP in recent years ▪ Most developers have poor access to funding, and struggle to get new IP to market ▪ Even the larger developers struggle to fund and retain ownership in new IP, particularly for current generation console games ▪ Work for hire on third party IP dominates most developer's output, and the predominant commercial models ensure that overages are rare, capping growth potential of most studios ▪ Many of the best developers are now in foreign hands after a rash of acquisitions of companies strong in working for hire ▪ High-cost economy, with labour costs just below USA, but far above Canada ▪ Low levels of governmental support sees U.K. companies competing on an uneven playing field, and steadily losing ground ▪ Industry-academic links are largely skin-deep and recruitment is difficult for most ▪ Consolidation resulted in a concentration of talent in more stable studios, which become targets for publisher takeover ▪ The weakness of the US dollar has made development in the U.K. more expensive for a largely US-dominated publisher market ▪ Under-represented in the increasingly important online games sector 	<ul style="list-style-type: none"> ▪ Continued position as one of the world's leading destinations for AAA ▪ IP creation as work for hire produces strong games from independent and publisher studios ▪ Cross-fertilisation from other worldclass media enables new IP to flourish ▪ New platforms offer opportunities to harvest value from older IP, and experience of older platforms will win new business for studios ▪ Rising numbers of games and nongames graduates supplies demand ▪ Service companies thrive as the supply chain diversifies via online service provision 	<ul style="list-style-type: none"> ▪ Grassroots could fail to be renewed as barriers to entry restrict smaller companies starting up ▪ Stasis – larger companies could grow their development resource overseas (especially Canada) and not in the U.K. ▪ Senior staff could be drained to U.S. and Canada ▪ AAA IP fails to stay in UK companies' hands ▪ The cycle of start-ups is broken as large studios sequester increasingly rare talent ▪ Independents could no longer afford to create AAA IP for current generation consoles, leading to technology and IP poverty, and loss of world-class status ▪ Poor links between industry and universities could prolong recruitment shortage ▪ New world-class IP could fail to reach the market ▪ The US dollar may continue to weaken, increasing the cost for US publishers of using UK development

(UK Trade & Investment 2007)

Appendix 6: Games and games-related courses in Australia

This appendix consists of higher education, VET, and short games and games-related courses offered by providers in Australia. (Note: not all courses in Australia may be included in this list, names of some courses may have changed, and some courses may no longer exist)

Higher Education courses

- ◆ Bachelor of Games and Virtual Worlds (Programming), Academy of Interactive Entertainment, ACT
- ◆ Bachelor of Computer Science (Games Technology), Charles Sturt University, NSW
- ◆ Bachelor of Computer Science (Games Technology - Honours), Charles Sturt University, NSW
- ◆ Bachelor of Arts (Visual Communication), majoring in Games Design, Raffles College of Design and Commerce, NSW
- ◆ Bachelor of Interactive Entertainment (major in Games Programming), QANTM College, NSW, QLD, VIC
- ◆ Bachelor of Interactive Entertainment (major in Games Design), QANTM College, NSW, QLD, VIC
- ◆ Bachelor of Interactive Entertainment (major in Animation), QANTM College, NSW, QLD, VIC
- ◆ Bachelor of Creative Technology, JMC Academy, NSW, QLD, VIC
- ◆ Associate Degree of Digital Media, JMC Academy, NSW, QLD, VIC
- ◆ Bachelor of Science (Games Development), University of Technology Sydney, NSW
- ◆ Master of Animation, University of Technology Sydney, NSW
- ◆ Bachelor of Computer Science (Multimedia and Game Development), University of Wollongong, NSW
- ◆ Bachelor of Games Design, Griffith University, QLD
- ◆ Bachelor of Fine Arts (Animation), Queensland University of Technology, QLD
- ◆ Bachelor of Technology Innovation (Games Technology), Queensland University of Technology, QLD
- ◆ Bachelor of IT (Games Design and Development), Deakin University, VIC
- ◆ Bachelor of Computer Science in Games Technology, LaTrobe University, VIC
- ◆ Bachelor of Software Engineering, Melbourne University, VIC
- ◆ Bachelor of Computer Science, Monash University, VIC
- ◆ Bachelor of Software Engineering (includes games electives), Monash University, VIC
- ◆ Bachelor of Multimedia and Digital Arts, Monash University, VIC
- ◆ Bachelor of Information Technology and Systems (major in Multimedia Games Development), Monash University, VIC
- ◆ Bachelor of Arts (Games Graphics Design), RMIT University, VIC
- ◆ Bachelor of Information Technology (Games and Graphics Programming), RMIT University, VIC
- ◆ Bachelor of Multimedia (Games and Interactivity)/Bachelor of Science (Computer Science and Software Engineering) double degree, Swinburne University of Technology, VIC
- ◆ Bachelor of Information Technology (Computer Games), University of Ballarat, VIC
- ◆ Bachelor of Computer Science (Games Programming), Edith Cowan University, WA
- ◆ Bachelor of Creative Industries (Game Design and Culture), Edith Cowan University, WA
- ◆ Bachelor of Science (Digital Media), Edith Cowan University, WA
- ◆ Graduate Diploma of Games Programming, Edith Cowan University, WA
- ◆ Bachelor of Science in Games Technology, Murdoch University, WA

Vocational Education and Training (VET) courses (Diploma/Advanced Diploma levels only)

- ◆ ICA50905 Diploma of Information Technology (Multimedia) (NTIS)
- ◆ 91277NSW Diploma of 3D Animation and Digital Effects (NTIS) (TAFENSW Listing)
- ◆ 91278NSW Diploma of Game Artistry (NTIS) (TAFENSW Listing)
- ◆ 91399NSW Diploma of Information Technology (Games Development) (NTIS) (TAFENSW Listing)
- ◆ 51767 Diploma of Animation (WA Course Listing) (NTIS)
- ◆ 52046 Diploma of Interactive Games Development (WA) (NTIS)
- ◆ 80252ACT - Diploma of Computer Game Development (Animation)
- ◆ 052 Advanced Diploma of Screen (Game Artist) (SA modified - CUF60101)
- ◆ 21543VIC Advanced Diploma of Interactive Applications (Games Art) (Victorian Training Support)
- ◆ 21544VIC Advanced Diploma of Interactive Applications (Victorian Training Support)
- ◆ 21662VIC Advanced Diploma of Interactive Applications (Virtual World Art) (NTIS) (Victorian Training Support)
- ◆ 21663VIC Advanced Diploma of Interactive Applications (Virtual World Programming) (NTIS) (Victorian Training Support)
- ◆ CUF60101 - Advanced Diploma of Screen (3D Animation and Visual FX) - Alias Maya (AIE course offering)
- ◆ 30676QLD Advanced Diploma of Commercial Arts (Electronic Design and Interactive Media) (Outline) (NTIS)
- ◆ ACT80841ACT Advanced Diploma of Professional Game Development NTIS) (AIE course offering & AIE course offering) Art Software Development

(IBSA 2009, pp. 23-24)

Selected short courses

- ◆ Digital Compositing and Visual FX, Academy of Interactive Entertainment
- ◆ Architectural Visualisation, Academy of Interactive Entertainment
- ◆ Character Creation, Academy of Interactive Entertainment
- ◆ Making games with gamemaker, Academy of Interactive Entertainment
- ◆ Game Design and Development Fundamentals, Academy of Interactive Entertainment
- ◆ Introduction to Games Programming, Academy of Interactive Entertainment
- ◆ Maya: Beginners, Academy of Interactive Entertainment
- ◆ Mudbox Workshop: Advanced, Academy of Interactive Entertainment
- ◆ School holiday courses: Advanced, Academy of Interactive Entertainment
- ◆ 3D Studio Max fundamentals, Victoria University
- ◆ 3D Studio Max for Game Making, Victoria University
- ◆ iPhone 3D Application Design, Victoria University
- ◆ Z Brush Beginner, Victoria University
- ◆ Z Brush Advanced, Victoria University
- ◆ Introduction to Maya, Victoria University
- ◆ Maya: Beyond the Basics, Victoria University
- ◆ Maya: Introduction to Characters, Victoria University
- ◆ Autodesk Softimage XSI Beginner, Victoria University
- ◆ Introduction to Motion Capture, Victoria University

Appendix 7: Core topics in IDGA's Curriculum Framework

This appendix consists of the International Games Developers Association's (IDGA) curriculum framework for games-related education.

Critical Game Studies

Criticism, Analysis & History of electronic and non-electronic games - This interdisciplinary Core Topic combines approaches from history, literature, media studies, and design. A key goal of critical game studies is to develop and refine a critical vocabulary for articulating the aesthetics of games. This includes both the distinctive features unique to games and those they share with other forms of media and culture. Critical game studies, for example, offers insight into the textual analysis of game play, whereas established work on other media, such as literature, film, television, theatre, and interactive arts can provide rich critical frameworks. Also included here are: the history of computers and digital games and toys; the construction and critique of a canon of significant and influential games; and game criticism and journalism.

Game Criticism

Game studies

- Ludology – studying game and play activities
- Critical theory and research
- Critical vocabulary for discussing games and play, including the evaluation of game mechanics, game play, game flow and game design and forms of gameplay experience that influence game design
- Establishing and critiquing the canon of influential and/or important games

Experience-centered criticism (Player-centered approach)

- Study of interactivity, human-interaction technologies
- Function and uses of exploration in virtual worlds
- Encouraging and supporting player “agency”
- Creating and sustaining player immersion
- Supporting the suspension of disbelief
- Study of human virtual social interactions

Consumer-oriented criticism

- Analysing and understanding the function and current state of the gaming press
- The function and current state of game reviews
- Tools, techniques and standards of print and media journalism
- Legislative and judicial impact on the game industry
- Game advertising

Genre analysis

- What genres exist?
- How are game genres defined?
- History of game genres (genres that have come and gone)
- Are genres useful? How does the application of genre analysis differ when applied to games as opposed to other media?

Auteur studies

- Given the collaborative nature of game development, who actually creates a game?
- Does the concept of authorship apply to individual games?
- Does the concept of authorship apply to an individual's body of work as a whole?
- “Branding” of games as being the work of one author

Analysis of Game Design

- Gameplay
- Narrative/Game writing
- Story and Plot
- Character Development
- Art design
- Sound design
- Interaction design (How do new interaction devices influence forms of play?)
- Simulation Methodologies

Media Studies

Non-game media, such as literature, radio, film, television, art, theatre, graphic novels, architecture, Internet

Media Research Methods

- Data collection methods
- Ethnography – Qualitative and Quantitative

- Technology survey (study and comparison of different technologies, their performance and their potential)
- Experimental technologies (building new gaming technologies, particularly hardware)
- Introduction to mass media/pop culture research
- General media effects research
- Game-specific research
- Player-focused research

Core Experiences

- Write a game review
- Read game criticism
- Write game criticism

Games and Society

Understanding how games reflect and construct individuals and groups, as well as how games reflect and are constructed by individuals and groups. In this Core Topic, sociology, anthropology, cultural studies and psychology offer important insights into worldwide gaming culture. Games and society includes scholarly work on online economies and community building, fan cultures and their creative modifications of game content, the role of play in human culture, and the relationship between online and offline identity. Also found here are issues of representation, ideology, and rhetoric as they relate to gaming. This Core Topic covers the psychological facets of games including studies of media effects and the ongoing debate about the psychological impact of games on individuals and groups. This core topic also examines how individuals and groups construct games. It explores how values, identities, and cultural images shape game production. Finally, this core topic examines how technologies, legal institutions, government policies, and corporations mold the production of video games. Placing games in a broader social, political, and economic context can provide insight into how a game came to be.

Players and Effects

Gaming demographics

- Gender and diversity of players
- Childhood, education and child development
- Understanding the choices and patterns of buyers and players
- Information sources, game related organizations

The "Cultures" of Gaming

- Pop Culture: Games as icons and cultural artifacts
- Fan Culture: Game communities and their members
 - Why communities form
 - How to encourage the creation of fan communities and how to support them
 - Game merchandizing
 - Fan communities from related media
 - Online communities: design and dynamics
- Mass Culture: Cultural dialogue about games
 - Games in other media (film, television, books, etc)
 - Games in the larger perspective of cultural impact of computers

History

- Famous designers, people and events that have defined the field
- Electronic games / Non-electronic games / Online Games
- Computers / Platform studies
- Preservation of Digital Technologies
- Games from other countries

Experience of Play

Historical aspects of the experience of play

- History of play
- Cross-cultural anthropology of play
- Commonalities and differences of games across national boundaries
- Role of the economy in history of play (leisure time, spare money for toys...)

Social aspects

- Social games, online and massively multiplayer games
- How games create "safe spaces" for play: experimentation
- How they are used in social settings
- How they support and break traditional social roles
- Effects of cheating (during the game vs while practicing/learning, using built in cheats)
- Stereotypes in games (characters, settings)
- Ethical and social issues in games

Psychological aspects

- How emotional responses are triggered and manipulated by games
- Cognitive theory
 - o Mental Models
 - o Problem-solving
- Theories of intelligence
- Applicability of developmental models
- Reactions to games by others (like reactions to comics and rock music, political legislation, law suits)
- How games rely upon and affect our understanding of ourselves and others
- Research into the relationship between games and violence
- Research into games and addiction

Economic aspects

- Push for larger sales – more sequels of successful products, more licensed products)
- The role of game quality and supply in the crash of the 80s
- Changing demographics, new opportunities

Human/machine interaction

- Usability issues (e.g. making game interfaces easy to learn and easy to use)
- Accessibility issues (e.g. dealing with users having special needs)

The Construction of Games and Game Technologies*Historical aspects of the technologies and institutions that frame the game industry*

- History of game technologies
- History of game companies
- History of video game litigation and patents

Anthropology of the Game Industry

- Political and Economic Context of the Game Industry
- Practice of Game Development
- Cultural Context of Game Development
- Game Developer "Culture"
- The Intersection of Gamer Culture and Game Producer Culture
- The Transnational Production of Games and Game Technologies

Game Design

Principles and methodologies behind the rules and play of games - This Core Topic addresses the fundamental ideas behind the design of electronic and non-electronic games. Game design includes gameplay, storytelling, challenges, and basic interactive design, including interface design, information design, and world interaction. Perhaps most important for game design is a detailed study of how games function to construct experiences, including rule design, play mechanics, game balancing, social game interaction, and the integration of visual, audio, tactile and textual elements into the total game experience. More practical aspects of game design, such as game design documentation and playtesting are also covered. This is the Core Topic most intrinsic to games themselves and is therefore in some ways the heart of the curriculum framework we outline here. On the other hand, because it is the least understood, trained instructors and quality reference materials are sorely lacking, making it among the most challenging Core Topics to teach.

Conceptual Game Design*Understanding the atomic parts of games*

- Game objects (tokens) and game setting
- Rules
- Dynamics
- Play mechanics
- Goal(s)
- Conflict
- Theme/Colour

Play Mechanics

- What are game "rules"?
 - o How should they be structured?
 - o How do you create the right balance of obstacles/aids, penalties/rewards?
 - o The nature of 'world' and interaction.
- Core mechanics: What are they? How do they shape gameplay?
 - o Types of play mechanics: discrete/continuous input, deterministic/random outcome, etc.
 - o Information flow as a key component of systems design

- Player input
- System output
- Information feedback loops
- The importance of maintaining a tight information feedback loop

- Game theory: two-player games and strategies, payoff matrices, Nash equilibrium, etc.
- How are play mechanics shaped or influenced by the game genre or platform?
- When are games too hard, too easy? Why?
 - o How does difficulty influence gameplay?
 - o What are the consequences of a game being too hard or too easy?
- What sorts of play mechanics work best for what sorts of people?
- The study of strategic decision-making in competitive and cooperative situations (Prisoner's Dilemma, etc.)
- The role of balance in game design
 - o Situational Balancing techniques (Area vs. Point effects, Resist Gear vs. Combat Gear)
 - o Equivalency Balancing (Damage per Second, accuracy vs. power, etc.)
- Transitive versus Intransitive mechanics
- Modelling Methods

Approaches to Game Design

- Thinking about design algorithmically
 - o Bottom-up versus top-down design
- Player experience approach – design for the moment
- World design – building gameplay from within a story and setting
- How are play mechanics shaped or influenced by the game genre or platform?
- What sorts of play mechanics work best for what sorts of people?

Boardgame and Roleplaying design

- Wargames
- Role Playing Games
- Collectable Card games
- The role of chance and probability
- Narrative and flavour versus mechanics

Ideas

- Generating new ideas
 - o Individual and group brainstorming
 - o Seeing the systems in the world around you
- Turning ideas into game concepts
- Evaluating game concepts using design documents and game prototypes

Fun

- What does “fun” mean?
- Different kinds of fun: exploration, character advancement/growth, social experience, challenge, etc.
- Does a game have to be “fun”?
- Why people play

Abstract design elements

- Positive and Negative feedback systems
 - o Game balancing tools
 - o Player rewards and punishments
 - o Challenge and “flow”
- Emergent complexity
 - o Interactions among systems that lead to unique player experience
 - o Controlling emergent complexity to keep it from breaking the game
 - o Player intent, and making systems clear enough that the player can understand, predict and control them
- Simulation & Emulation
 - o Using systems that allow flexible response versus specific behaviours for preconceived situations
- Communication systems
 - o How much information does the player need?
 - o What's the best way to get information to the player?
 - o Layered communication
 - o Subconscious communication

Psychological design considerations

- Operant conditioning

- Flow states
- Addiction in gaming
- Rewards and penalties
- Difficulty curve
- Creating diverse social systems
- Keeping the players in the game / bringing them back over time
- Fostering variety of gameplay styles

Interface design

- Interface design theory / Computer UI theory
- Human-Computer Interaction
 - Novel or specialized interfaces
- Information visualization
- User task modeling
- Balancing player control schemes -- simplicity versus expressiveness.
- The impact of specific hardware constraints – controllers, keyboards, headsets, etc.

Iterative nature of game design: create, test, change, and repeat

Serious Game Design

- Uses of games in medical, training, therapeutic and other non-entertainment applications
- Education
- Training
- Therapeutic uses
- Simulation
- Use of games for political statements
- Use of games as an artistic medium
- Working with content experts
- Instructional Design
- Assessment – Evaluation of the game as an educational or training tool.

Practical Game Design

Spatial design

- Gameplay spaces
 - Representational spaces
 - Abstract spaces
 - Space and pacing
 - Space and narrative
- Creating densely interactive, highly responsive worlds
- Goal communication through spatial design

Task design

- Action and interaction
 - World/geometry interaction
 - Character interaction
 - Puzzles
- Providing adequate feedback to players

Design integration

- Melding space and task
- Integrating art and gameplay
- Design implications of platform choice

Control schemes

- Direct/Indirect Manipulation
- Movement and Navigation
- Items and item manipulation
- Inventories
- Natural controller mappings

Custom Tool Use

- Getting Design Concepts into a Game's Underlying System

Training

- Teaching your players how to play the game / what can be done in the game; integrating tutorials within the game
- Supporting learning with consistent challenges and appropriate feedback.

- Communicating with the player regarding challenges, actions and abilities within the game world
- Keeping track of what the player has done in the game / giving feedback about remaining goals

Game tuning

- Understanding games as dynamic systems
- What makes a balanced game
- Applying game-tuning strategies in light of feedback from actual play
- Balancing player advancement with challenge advancement

Game player analysis

- Understanding who your audience is
- Designing for diverse populations
- What criteria to use to measure success with a given audience
- Working with Quality Assurance
 - o Bug tracking, bug assignment
 - o Understanding how to write feedback to others

Play testing (used much more in production, but can also be used in design phase as well)

- Ethical considerations in human subjects testing
- Think-aloud protocols
- Differences and similarities between usability testing and play testing
- Interviews/Questionnaires
- Observation
- Beta testing
- Testing under different constraints: testing by yourself, testing with your close friends/colleagues, supervising a test with complete strangers, blindtesting

Prototyping

- Paper prototyping
- Rapid, light-weight computer-based prototyping
- Creating physical prototypes for turn-based videogames
- Creating physical prototypes for realtime videogames
- Creating digital prototypes of individual systems or mechanics

Game Design Documentation

- Writing and maintaining a game design document
- Writing concepts, proposals, rules documents and design documentation
- Communicating design ideas clearly to the team
 - o Appropriate level of detail
 - o Making design requirements understandable to artists and programmers
- Change tracking

Content design

- Level design

Game Programming

Aspects of traditional computer science and software engineering – modified to address the technical aspects of gaming - This Core Topic includes physics, mathematics, programming techniques, algorithm design, game-specific programming and the technical aspects of game testing. Much of the material in this area could be taught under the auspices of a traditional computer science or software engineering curriculum. However, games do present a very specific set of programming challenges, such as optimization of mainstream algorithms such as path-finding and sorting, and real-time 3D rendering, that are addressed here.

Math and Science techniques

- Basic Newtonian physics
- Computational mechanics
- Probability and statistics
- Geometry, discrete math and linear algebra
 - o Vectors and Matrices
 - o Coordinate spaces and transformations
 - o Collision Detection
- Computational geometry
- Basic calculus and differential equations

Style & design principles

- Coherency
- Object oriented programming paradigms

- Design patterns
 - Game design patterns

Information design

- Data structures – data architecture, file formats, data organization, data compression
- Asset pipelining
- Computational geometry
- Environmental models, spatial data structures
- Database
- Machine Architecture
- Optimization (CPU and GPU)
- Embedded System Development
- Configuration Control and Source Control Systems
- Software Architecture
- Software Engineering

Game Engine Design

- Purpose and importance
- Architecture and design
- Data Pipelines
- Methodologies and practices to create stand-alone gaming applications,
 - Limitations of implementing cross-platform technology
- Generic and universal issues in programming for 3D engines
 - Graphics libraries and 3D hardware issues
 - Programming object and camera motions
 - Collision detection and collision response
 - Performance analysis
 - Special effects

Prototyping

- Tools and skills for fast, iterative development
- Building flexible systems, configurable by others

Programming teams -- structure and working relationships

- Working in interdisciplinary teams
- Talking with programmers/artists/designers/producers/etc.
- Team programming processes and methodologies

Design/Technology synthesis

- Supporting player goals and actions
- Building intelligent, coherent, consistent, reactive game environments
- Platform issues

System architecture for real time game environments and simulations

- Concurrent programming techniques
- Integration of sub systems (Physics, Collision detection, AI, Input, Render, Scripting)
- Incorporating and extending third party systems in a game engine.
- Resource budgeting (CPU, GPU, memory)

Computer Architecture

- Structure of a CPU with implications to program design (eg, avoiding branching)
- The memory hierarchy with implications to program design (eg, alignment of data structures in memory, locality of reference)
- Algorithm design considerations for CPU versus GPU implementation Tools construction
- "Tool Development"
- GUI creation
- Tools for multimedia content creation, modification and management
- Custom design tools
- Building flexible systems for non-programmers to use

Graphics Programming

- Rendering
 - Transforms, lighting, texturing
 - Clipping, occlusions, transparency
 - Level of detail considerations
 - Using data structures to optimise rendering time

- Animation
 - o Forward and inverse kinematics
 - o Transform representations
 - o Interpolation techniques
 - o Camera animation
- Graphics System Design
- Procedural content generation (Textures, Models, etc.)

Sound / Audio Programming

- Physics of sound and human hearing
- Programming 3D positional sound
- Utilizing Audio Channels
- Audio Prioritization

Artificial intelligence

- Difference in goals between Game AI and traditional AI
- Path planning, search algorithms
- Agent architectures
- Decision-making systems
- State machine design
- Statistical machine learning

Networks

- Networking and Server design
- Performance metrics
- Topologies
- Protocols – TCP/IP, UDP, ...
- Security
- Game Servers
- Game Protocol Development
- Available Network Libraries
- Open Source Network Game Case Studies

Game logic

- Compilers
- Scripting languages

Play analysis

- Play testing to monitor player frustration, progress and enjoyment
- Monitoring player state -- gameplay data logging
- Player metrics

Visual Design

Designing, creating and analyzing the visual components of games - This topic includes visual design fundamentals, both on and off the computer, across a broad range of media. Content areas include: history, analysis and production in traditional art media such as painting, drawing and sculpture; communication fields like illustration, typography and graphic design; other design disciplines such as architecture and industrial design; and time-based media like animation and filmmaking. Special emphasis is placed on how visual aesthetics play a role in the game experience. Use of 2D and 3D graphics programs can be an important part of a visual design curriculum. However, our emphasis is on fundamental visual design principles rather than on specific software packages.

Basic Visual Design

- Art history & theory
- Visual design fundamentals
 - o Composition
 - o Lighting and colour
 - o Graphic design and typography
- Fundamentals of drawing
- Painting techniques
- Sculpting
- Anatomy and life drawing
- Physiology and kinesiology

Non-narrative graphics/Abstraction as expressive tool

Visual design in an interactive context

Visual narratives: painting, comics, photography, film

Motion Graphics

- Animation
- Cinematography
- Camera angles and framing
- Visual narrative/storyboarding
- Filmmaking: framing, types of shots and camera movement, editing
- Kinematics

Visual asset generation

- 2d graphics
 - o Pixel Art
- 3d modelling
- Textures
- Interface design
- Character design
 - o Conceptual design
 - o Character modelling
 - o Character animation

World Design

- Environmental modeling

Architecture

- Fundamental principles of architecture
- History of architecture
- Fundamental principles of architecture
- Real-world spaces vs. game spaces
- Space design
- Navigation
- Materials

Working with 3D Hardware

- Procedural shading
- Lighting
- Effects

Game Art (digital based art with game content)

- Custom tool use – getting game art into a game's engine

Information VisualizationProcedural content**Audio Design**

Designing and creating sound and sound environments - This core topic includes a range of theoretical and practical audio-related areas, such as: music theory and history; music composition; aesthetic analysis of music; recording studio skills; and electronic sound generation. Audio relating specifically to digital game technologies, such as 3D sound processing and generative audio structures, is also included. Throughout, special emphasis is placed on the role of audio experience within the larger context of a game. As with visual design, the emphasis is on design fundamentals rather than on specific technical knowledge.

Audio history & theoryBasic technical skillsBasic studio skills

- Familiarity with hardware and software (e.g. microphones, mixers, outboard gear)
- Recording, mixing and mastering.
- Studio organization

Audio ProgrammingAudio AssetsAudio ToolsAudio Design Fundamentals

- Setting mood, managing tension and resolution
- Processing, mixing and controlling sound for aesthetic effect
- General workflow for game creation
- Audio engine terminology and functionality

Introduction to Interactive Audio

- Designing sound for interactivity

- Sound effects
- Music
- Voice recording

Sound Effects

- Simulation of sound environments
- Ambience versus musicality in soundtracks

Music

- Composition
- Interactive scoring

Audio

- Fundamentals of 3D and multi-channel sound.
- Modelling for effects, echo, room size simulation

Interactive Storytelling

Traditional storytelling and the challenges of interactive narrative - Writers and designers of interactive works need a solid understanding of traditional narrative theory, character development, plot, dialogue, back-story, and world creation, as well as experimental approaches to storytelling in literature, theatre, and film with relevance to games. In addition, interactive storytelling requires familiarity with new tools and techniques, including the technical aspects of writing for this new medium, algorithmic storytelling, and collaborative story construction. In this Core Topic, these approaches are applied to the unique context of interactive storytelling in games.

Story in Non-Interactive Media

- Literary Theory & Narratology
 - o Traditional narrative “act” structure
 - o Thinking abstractly and concretely about “story”
 - o Traditional Narratives (folktales)
 - o Structuralism/Narratology
 - o Post-structuralism (Barthes, Baudrillard, etc.)
 - o Post-modern literature
- Theatre
 - o Performance Theory
 - o Theorists: Aristotle, Brecht, Artaud, Boal, etc.
- Story creation
 - o Setting: time, place
 - o Character: Actions, motivations, dialogue
 - o Events
- Discourse
 - o Style
 - o Voice and Point of View
 - o Event Structure
- Characterization in fiction, film and theatre
- Introduction to film and literary theory
- Theories of game and narrative
- Context-setting versus traditional storytelling
- Back-story and fictional setting design
- Creating compelling characters

Narrative in Interactive Media

- Theoretical issues
 - o Agency, immersion
 - o Interactivity vs. narrative
 - o Cybertext
 - o Algorithmic storytelling and process intensity
 - o Cohesion and “well-formed” narrative
- Interactive story in non-computer-based media
 - o Role-playing games
 - o Oral storytelling
 - o Literary examples – Oulipo, Nabakov's Pale Fire, etc.
 - o Theatre examples – Forum theatre, theatre of the oppressed, etc.
- Alternating fixed story with interactive game
 - o Visual Novels (Japanese genre)

- Exploratory narratives
 - o Hypertext
- Branching trees: branching narrative, branching dialogue
- Emergent narrative approaches
 - o Story generators
- Interactive fiction
- Collaborative storytelling
 - o Web-based collaborative stories
 - o Alternative reality games
 - o MUDs, MMOGs

Writing for other media

- Fiction-writing
- Dramatic writing
 - o Screenwriting
 - o Playwriting
 - o Writing for the radio

Abstract audiovisual narrative

- Semiotics and symbology
- Creating mood and drama with music and sound

Game Production

Practical challenges of managing the development of games - Games are among of the most complex forms of software to create, and game development and publishing are complex, collaborative efforts. Along with all the technical challenges of software development, issues of design documentation, content creation, team roles, group dynamics, risk analysis, people management, and process management are addressed in this Core Topic. Although there is growing literature on game production, there are also rich traditions in software engineering and project management from which to draw for this Core Topic.

People management and collaborative development

Budgeting a development project

Where to find industry standard info, industry info – trades, trades from different parts of the industry, other media trades

Typical budgets and budget categories

Team make-up

- Job descriptions
- Recruiting, training
- Balancing talent, experience, budget

The Game Development Lifecycle

- Pre-production / Production / Testing
- Shipping and maintaining customer loyalty
- Different approaches to production process
 - o Waterfall, spiral, v-shaped, evolutionary, Scrum/Agile, iterative/incremental development, rapid prototyping, etc.
 - o Strengths and weaknesses
 - o Issues specific to game development

Workflow

- Knowing which tools to use and when
- Evaluating and using computer-supported collaborative work tools
 - o Bug-tracking systems
 - o Wikis
 - o Spreadsheets
 - o Message boards/forums
 - o Databases
 - o Version-control
- Problem evaluation and investing appropriate resources
- Task breakdown
 - o Creating a backlog
 - o Dropping features

Group dynamics

- Team building
- Establishing clear roles and clear goals
- Realities of development teams

- Building effective teams
 - Working as a team to realize a unified gameplay vision
 - Leadership, delegation and responsibility
 - Defining the interfaces between team members

Design and development documentation

- Why document?
- What should you document?
- How much documentation is enough/too much?
- Who is the audience for the documentation?
- To storyboard or not to storyboard?
- Non-text based documentation: using prototypes, physical models, pictures, ...
- Design and Development Documents
 - Concept Document/Proposal
 - Game Specifications
 - Design Document
 - Story Bible
 - Script
 - Art Bible
 - Storyboards
 - Technical Design Document
 - Schedules and Business/Marketing Documents
 - Test Plan

Testing

- Code review and test harnesses
- Designing tests and incorporating feedback from Quality Assurance
- Bug fixing, bug databases, creating stable code bases

Scheduling and Time Management

- Creating a schedule
- Goals of a schedule - milestones
- Balancing quality and reality
- Working with a schedule, using it to help you ship
- Typical schedules
- Crunch time issues
- Quality of life issues

Communication skills

- Rhetoric
 - Communicating with peers, supervisors and subordinates
 - Communicating clearly in print and in speech
 - Collaboration skills - speaking the same language
 - Collaboration skills – speaking across disciplinary divides (you won't always have a "same language." (bridging "language" gaps)

Coordinating the efforts of development, quality assurance, sales, marketing, public relations and finance

Localization issues, processes and skills

- Writing "around" the game
 - Packaging
 - Player manuals, websites, etc.

Product post-mortems

- Evaluating decisions, after the fact
 - Design decisions
 - Process decisions
 - Business decisions

Quality Assurance

- Planning and QA Plans

Defect Tracking

Technical Reviews and Inspections

Architecture

- Software Testing
 - Beta Testing
 - System Testing
 - Code review and test harnesses
 - Designing tests and incorporating feedback from Quality Assurance

- o Bug fixing, bug databases, creating stable code bases

- Game Testing

Working with marketing

- Marketing plans and schedules
- Marketing asset needs

Business of Gaming

Economic, legal and policy aspects of games - The economics of the game industry – how games are funded, marketed and sold, and the relationships among publishers, developers, distributors, marketers, retailers, and other kinds of companies are addressed here. Market and industry trends, licensing management, the dynamics of company and product value, and business differences between major game platforms are all important aspects of the business of gaming. In addition, legal issues that affect games, developers and players, such as intellectual property and contract law, are part of this Core Topic. Lastly, social and governmental forces that impact the legislation and regulation of game content are included here.

Game industry economics

- Retailers, shelf-space, digital distribution: How audiences currently reach the games
- Platform choices – the tradeoffs of developing for consoles, PCs and handheld and mobile devices
- Internationalization / globalization of development
 - o Offshoring/outsourcing
 - o Changing barriers-to-entry (knowledge, technology, manpower)
 - o Challenges of cultures, distance, time-zones
- Distribution channels
- Microtransactions, one-time payment, software as a service with monthly payments, free to play with some features available to paying members, etc.
- Real money transactions in virtual worlds and MMOs
- Different delivery method and revenue streams (MS Arcade, PS Home, ...)
- Independent vs Publisher/Developer game development
- Piracy

Audience

- Marketing and sales: How games currently reach an audience
- Understanding audiences for different game genres
- How to reach and keep given audiences
- Consumer behaviour and psychology (what do consumers of various sorts and various populations want?)

Publisher/Developer Relationships

- The deal
 - o What it covers
 - o How it gets done
 - o What it is likely to say
 - o Greenlighting process
- Day-to-day: Once signed up, what interactions and processes occur
- Milestone review

Intellectual property

- • Technology and Copyright
 - o Key Cases
 - o Major players
- Content
- Licenses
 - o Acquisition of licenses
 - o Use of licenses
 - o Working with licensors
- Piracy

Patents and the game industry

Contracts

- Publisher/developer
- Employer/employee
- Contractors

Content Regulation

- Game Ratings and Classification
 - o ESRB (North America)
 - o PEGI (Europe)
 - o CERO (Japan)
- Government regulation – North America, Europe/Oceania, and Asia

Appendix 8: Diploma/Advanced Diploma competencies for games courses in Australia

This chapter consists of Innovation & Business Skills Australia's (IBSA) recommended competencies for games courses at the Diploma and Advanced Diploma levels.

Digital Media Design

CUFDIG501A Coordinate the testing of interactive media products
 CUFDIG502A Design web environments
 CUFDIG503A Design elearning resources
 CUFDIG504A Design games
 CUFDIG505A Design information architecture
 CUFDIG506A Design interaction
 CUFDIG507A Design digital simulations

Animation

CUFANM501A Create 3D digital character animation
 CUFANM502A Create 3D digital environments
 CUFANM503A Design animation and digital visual effects

Animation Detailed (NSW)

NSWTANM501A Research and source reference for the 3D animation & digital effects environment
 NSWTANM502A Design and create advanced particles, fluids and bodies for 3D and/or digital effects environment
 NSWTANM503A Create and implement design for organic materials for the 3D & digital effects environment
 NSWTANM504A Create & implement design for shading for the 3D & digital effects environment
 NSWTANM505A Design & create advanced lighting for the 3D & digital effects environment
 NSWTANM506A Develop render pipeline for the 3D & digital effects environment
 NSWTANM507A Design and create models for the 3D & digital effects environment
 NSWTANM508A Create and combine 3D components with match-moved footage
 NSWTANM509A Create and implement animation rig for 3D character
 NSWTANM510A Create and implement anatomy for animation
 NSWTANM511A Animate appropriate physical attributes of models & characters for 3D & digital effects environment
 NSWTANM512A Use compositing software to create elements for the 3D & digital effects environment
 NSWTANM513A Write script using software embedded language for the 3D & digital effects environment
 NSWTANM514A Produce an animation and/or digital effects sequence
 NSWTANM515A Develop and use textures and UV mapping for the 3D and digital effects environment
 NSWTANM516A Participate in a 3D animation, digital effects or game design workplace production
 NSWTANM517A Analyse business & marketplace opportunities in 3D, game design and/or digital effects environment
 NSWTANM518A Present a portfolio/showreel to promote creative work
 NSWTANM519A Employ acting skills to improve movement of characters for the 3D & digital effects environment
 NSWTANM521A Produce an interactive product

Digital Media Design (Games)

WA50661FTI03A Identify and apply knowledge of game playing
 WA50661FTI08A Produce an interactive game project
 WA50661FTI09A Design interactive game play

3D and Digital Effects

VBN323 Develop graphical user interfaces (GUIs) for games
 VBN324 Create 3D characters for games
 VBN325 Create 3D environments for games
 VBN326 Create design documents for games
 VBN327 Develop scripts for games
 NSWTGAM501A Produce 3D components for interactive games
 NSWTGAM502A Design 3D game levels and environments

Virtual Worlds

VBP024 Develop graphical user interfaces (GUIs) for virtual worlds
 VBP026: Develop 3D environments for virtual worlds
 VBP025: Develop scripts for virtual worlds
 BSBEBUS508A Build a virtual community

Programming

ICAA4058B Apply skills in object-oriented design
ICAB4075B Use a library or pre-existing components
ICAB4219B Apply introductory object-oriented language skills
ICAB5226B Apply advanced object-oriented language skills
ICAITB181A Write and document program modules
ICAITB182A Write and compile code, based on requirements
ICAITB137A Produce basic client side script for dynamic web pages
ICAITT082A Manage the testing process
ICAITB170A Build a database
ICAITB068A Build using RAD
ICAITAD042B Determine client business needs
ICPMM581B Manage multimedia production
ICPMM61DA Prepare multimedia for different platforms

(IBSA 2009)

Appendix 9: Improving games courses

This appendix consists of suggestions by Worker Survey participants and responses to blog questions to improve current education and training courses in Australia.

- ◆ More practical experience in game design and artistic development.
- ◆ Basic skills can and are provided and a basic grasp of what is needed. Real understanding and experience cannot be obtained until working full time. Employers understand that they are looking for potential when hiring juniors. It should be impressed on students that hard work, thinking outside the square, and personal projects will see them being noticed above their peers.
- ◆ More information on games careers early in courses to allow students to choose effective course units for the industry. More work/industrial experience in a games studio as part of a course. Strong industry collaboration on under/postgraduate projects.
- ◆ Graduates need to do more than show up to interviews with a nice piece of paper. If their training had more focus on the students creating work they can show to employers they would be in a much better position.
- ◆ More internships, apprenticeship-like schemes
- ◆ Institutions should try to work closer with Industry so they can adjust courses according to what the industry requires.
- ◆ Make sure appropriate tools and software are taught. Work with developers to provide on-site training on a real project (even if their work is not used). Stay abreast of industry trends and more importantly speak to developers about the skills they need from new employees.
- ◆ Practise production methodology (e.g. Agile) and provide continued support during graduate internships at games companies.
- ◆ Get them to do more projects i.e. go through the full development cycle (including launch and post launch) a number of times. Educate them about the way the interactive entertainment business works i.e. business models etc. Make them more aware about how their input contributes to a business' financial success i.e. make them understand the mindset of a business owner
- ◆ Industry placements, internships, visiting game professionals. Form closer ties to the industries you hope to produce talent for and find out their requirements.
- ◆ Need more input from the industry. Need people with industry experience to teach the courses.
- ◆ Courses need to be run by people with higher qualifications and better understanding of their area of expertise. Most courses are run by people who lack the skills to work in the industry, and not up to date on how the industry works and what is required from employees to effectively perform their given job.
- ◆ There must be industry investment in and connection with training organisations. More work experience and intern opportunities. More government investment in the industry.
- ◆ Simulate real work conditions e.g. time pressures, tasks changing/shifting mid task. Having to pitch your idea, solution to superior. Having to estimate time it will take you to do a task. Graduates seem to have the basic skills and tools knowledge, but lack the understanding of how to apply and adapt their skills to a real life project.
- ◆ Specialisation of the courses. Upgrade training courses quality. Broaden courses and cover all disciplines. Training courses need people able to teach. The fact that some professionals do their job for a living doesn't mean they are qualified as teachers.
- ◆ There is no substitute for industry experience. Full project lifecycle experience. A realistic view of how their abilities stack up in the work place. Some of the final year project crap that people present is astoundingly bad. Strong prerequisites in maths would be a start. Companies I have worked for always prefer maths, physics, engineering and comp science graduates over games course graduates for programmers. I have never ever after 10 years in the industry seen a junior artist hired. They all have extensive post production, film, advertising and/or games industry experience.
- ◆ Give them time and scope during the latter part of their course to make a polished, shippable game, and sell it to the public - perhaps as an optional, Honours-style component, a bolt-on addition to an existing standalone course. Base a component of their grade on their earnings (cash, not copies, for realism and to prevent massive discounting from inflating the results), and let them keep the money and IP as an added incentive. Basically, the same as forming an indie gamedev company, except with ready-made partners, teacher oversight, and grades. Making it an optional elite course which costs extra should hopefully help to weed out the under-performers who tend to plague such group projects. Give scholarships where appropriate. I say this because creating, finishing, shipping, and SELLING an independently-developed game gave me more practical experience than a dozen unfinished hobbyist games ever did. The "credit card test" - does your game convince random strangers to pull out their credit card and buy it online? - is refreshingly honest. Failing (or only partly passing) the credit card test is an educational experience.

- ◆ Hire quality trainers with industry experience. Train for current process not outdated ones. Interact with industry companies to nurture talent, internships, master classes etc
- ◆ It's really about relevancy. Many students arrive in the industry with an over inflated sense of their capacity, which can clash with experience. Start with taking out ego and get students to understand that they are often only one part of a much larger puzzle.
- ◆ In-house training/placements with studios (similar to how journalists and CPAs train).
- ◆ Closer connection between industry and education. Students are often taught unnecessary skills or not taught techniques which are commonly used. Also not many teachers have high level industry experience.
- ◆ 3D/Maths related courses for programmers/artists/animators is invaluable.
- ◆ Training institutions need to provide a framework for the student to be able to produce a showreel that will help them to get them their desired junior position and in the process hopefully produce a game.
- ◆ Teaching fundamentals rather than advanced technical skills.
- ◆ Have people that work in the industry to teach, or at least create the course outline.
- ◆ Employ teachers with actual games industry experience. Academic game researchers do not qualify to teach game design. Teamwork teamwork teamwork exercises! At all games studios - including independent developers - developers work in teams of people with mixed backgrounds and areas of expertise. Anyone can come up with an idea, but knowing how to communicate it and build it within a complex team - ranging from 3 to 400+ people - is a valuable skill. Game development is not a lone venture.
- ◆ Australia needs more people who have successfully worked in the games industry extensively. Not people who do research in games, or people from IT who think that games are the same as other software. They're not.
- ◆ Hire more industry experienced people to teach students. Give the students access to the best tools and technology and give them hands on projects that give them something tangible at the end of their studies.
- ◆ A curriculum dictated by industry instead of education institutions would do the trick.

Appendix 10: Digital Native Academy's recommendations to improve games courses

This section consists of recommendations by the Digital Native Academy to address issues related to education and training provision for the UK games sector.

Theme 1: Supporting industry-education Links

Although there are instances of good practice, industry-education links need to be better supported and developed. Specifically at regional level:

- ◆ Investigate the benefits of a Computer Games – or perhaps a wider, Interactive Media - trade alliance for the region.
- ◆ Support providers at the regional level to locate and maintain high quality work placements.
- ◆ Hold a forum for the Serious Games Industry that could be involved in identifying and taking forward its agenda.

Theme 2: Supporting industry-based training and induction at entry level

The following recommendations are put forward to promote better awareness of the value of, and attitudes towards, in-company training at entry-level:

- ◆ Provide information and exchange to companies that enable them to see the value of training and development, particularly for inexperienced staff.
- ◆ Encourage education providers and companies working together at regional level to set up group induction or initial training schemes.
- ◆ Support for initiatives designed to create or support work placements for students, within degree programmes, through simulations, or postgraduate work.
- ◆ Support for work placements, graduate apprenticeship and other induction schemes in the region linked to students attending regional universities.

Theme 3: Raising the profile and quality of education provision

The following recommendations are intended to promote and raise the quality of educational provision for the Games Industry within the West Midlands region:

- ◆ Stronger industry-education links, in particular a forum (as above) to help ensure that education provision meets the needs of industry in the region more effectively.
- ◆ Design courses from scratch according to industry standards, and ensure that there is an adequate level of industry involvement in both initial and ongoing development. The final years of study should focus on aiding students in the production of high quality portfolios and show reels as appropriate.
- ◆ Encourage education providers to consider the main features of courses that are recognised as being excellent, whether accredited or non-accredited. They should use these as examples of best practice in an effort to raise the profile of such courses for both potential students and industry.
- ◆ Hold an annual industry/AWM sponsored regional event to showcase the achievements of the region's final year and postgraduate students would further raise the profile of provision in the West Midlands.
- ◆ Establish a games course tutors' forum in regional universities to discuss areas of synergy and potential collaboration and to share expertise.

Theme 4: Supporting the Serious Games Industry

The following recommendations are made in the context of an existing regional strategy to support Serious Games development as a potential growth industry:

- ◆ Encourage serious games developers to collaborate more closely with mainstream education and training providers including e-learning developers to exploit potential new markets alongside more conventional elearning.
- ◆ Encourage industry employers to make links with education providers in order to provide education related projects for their students.
- ◆ Identify the range of skill needs for serious games development for possible translation into education provision.
- ◆ Support small serious games companies working in the region. Coordinating activity must be done on a regional basis and not be linked exclusively to individual institutions.

Theme 5: Addressing knowledge gaps and intelligence needs

The research report also identifies areas where there is insufficient knowledge or where greater understanding would be beneficial. The following are seen as areas that could be more readily addressed through regional or national research:

- ◆ Further investigate serious games companies that looks at emerging markets, competition, finance and funding issues as well as business models, segmentation of the market and possible developments.
- ◆ Address the discrepancy between the views of industry informants and those of education providers in relation to the lack of understanding of the day-to-day work and skill requirements of the games industry.
- ◆ Address the lack of knowledge and data about the motivations, expectations and destinations of graduates.

Digital Native Academy (2008, pp. 8-9)

