



Solas an léinn
Makes a difference

Report Prepared by

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Overview

In Fall 2014, the Fulbright Commission in conjunction with the Higher Education Authority, the Irish Government, a number of Irish Higher Education institutions and the United States government arranged for a Fulbright specialist to work with participating educational institutions, representatives of the game industry, relevant government bodies and industry associations to seek ways to improve the game education sector in Ireland and, in doing so, strengthen its industry. The initiative was conceived of and driven by Bob Jackson, a lecturer with the Department of Creative Media, Information Technology and Computing from the Institute of Technology in Tralee.

Specifically, the Fulbright specialist was tasked to:

- Present lectures at graduate and undergraduate levels
- Participate in or lead seminars or workshops
- Conduct needs assessments, surveys, institutional or programmatic research
- Take part in specialized academic programs and conferences
- Consult with administrators and instructors of post-secondary, degree granting academic institutions on faculty development
- Develop and/or assess academic curricula or educational materials
- Meet with the games industry and identify skills that the Irish games industry requires to develop the industry.
- Conduct teacher-training programs at the degree-granting level

The desire for a specialist rose out of needs identified in 2013 by the Games Clustering Development Team (CDT) which was set up by the Department of Jobs, Enterprise and Innovation and influenced by the 2009 Forfas . Both the Irish industry and its academy recognize that strategies to develop a strong game industry require a successful collaboration between industry and education. It requires, too, a determination to support this growing industry from government bodies and affiliated organizations. Brenda Romero, a 33-year veteran of the video game industry and Program Director of the internationally ranked UC Santa Cruz's Masters in Games & Playable Media department (currently #7 in the world in the Princeton Review Graduate Program rankings) was selected for the task.

During the course of the Fulbright Fellowship, Romero visited the following institutions:

- Dublin Institute of Technology
- Limerick Institute of Technology
- Carlow Institute of Technology
- Tralee Institute of Technology
- University of Limerick
- Letterkenny Institute of Technology
- Ballyfermot College of Further Education

In addition to the institutions above, Romero lectured to or presented a workshop at the following institutions, educational or game development groups:

- Dundalk Institute of Technology
- CoderDojo
- Dubludo
- Galway game developers

Romero also met with the following elected officials, government organizations and industry associations.

- Jan O’Sullivan, Minister for Education
- Damien English TD, Minister of State at the Departments of Education and Skills and the Department of Jobs, Enterprise and Innovation with Special Responsibility for Skills, Research and Innovation
- Tom Boland, CEO, Higher Education Authority
- Department of Jobs, Enterprise and Innovation
- Games Ireland
- Irish Software Association
- ICT Ireland
- Enterprise Ireland
- Industrial Development Authority (IDA Ireland)
- American Chamber of Commerce Ireland
- National Digital Research Centre (NDRC)
- Expert Group on Future Skills Needs (EGFSN)
- Quality and Qualifications Ireland (QQI)

Lastly, prior to meeting with staff, faculty and students in the games education sector, Romero met extensively with individuals from the game industry throughout Ireland. The companies listed below:

- Microsoft Ireland
- Bethesda / Zenimax
- Riot Games
- Zynga
- Tribal City
- SixMinute Games
- Breakout Interactive
- StoryToys
- Digit Games
- BatCat Games
- Demonware
- BitSmith
- Studio PowWow
- DoomCube
- SnozBot
- PixelSoup

This report, then, is broken down into the four key subject areas of Game Education, Game Industry, Government and Game Associations. Within each subject, there is a Summary of Findings and Analysis of Findings.

Game Education

Summary of Findings

1. There are not enough junior positions in industry to accommodate graduating students, resulting in the loss of Irish talent to overseas markets
2. Education has shifted towards software programming languages that are easy to learn as opposed to languages needed by the industry.
3. Institutions offering challenging material should not be penalized for lower retention rates and thus incentivized to water down their curriculum and student quality. This adversely affects hiring rates.
4. Computer/Software Programming education needs to begin much earlier in the educational system so as to not place the entire responsibility on college-level courses.
5. Where possible and given student ability, programmes are encouraged to focus on more general foundational programming practices and languages.
6. Students who only know specific software packages and tools are constrained within the space that tool allows and are limited in their hiring options.
7. Communication between educators and industry needs to be facilitated and improved to build a stronger education sector.
8. Industry advisory boards are recommended for programmes in the game education sector.
9. Evaluation of industry-specific courses is recommended to make sure they are up to date with current industry practices
10. Funding for and training of educators in game industry-specific topics is desired and recommended.
11. Funding for attendance at GDC for at least one faculty member per game education programme is recommended.
12. Portfolios are central to a student's employability and project-oriented outcomes help students create proper portfolios.
13. Early introduction of industry-level developer tests will give students an understanding of expectations upon graduation.
14. Funding for the creation of game labs and libraries within game education programmes is desired and recommended.
15. Creation of flexible "special topic" courses are advised to allow for educators to cover emerging topics in the fast-moving game industry.
16. Participation in game jams is recommended to promote teamwork, provide experience and create portfolio pieces.
17. Opportunities exist in the education of students concerning Live/DevOps, server programming, level design, game production and game business.
18. Providing means for educators to get game industry experience or incentives for game industry veterans to enter game academia will strengthen the game education sector.

19. Appropriate expectations around what it takes to enter the game industry need to be communicated to educators and delivered to students.
20. Students are encouraged to explore the individual roles within the game industry and not just industry fields in general.
21. At least one game design course is recommended as mandatory for students pursuing game programming.
22. It is important for an education program looking to compete internationally to do well in the Princeton Review.

Analysis of Findings

Throughout the course of the Fulbright research, Brenda Romero met with dozens of faculty and staff members and hundreds of students. Far from the casual “we just like to play games”, the students in the programs visited by the Fulbright were deeply passionate about their chosen medium, eager to work hard in workshops and were adept at tackling design topics both fun and challenging. The faculty seemed genuinely engaged, in some cases spending long, long days to discuss how they could make their program better and graduate a higher quality student.

1. Strong Industry equals Strong Education Sector

Much like the rest of the world, Irish game universities and institutions produce a large amount of junior-level talent. However, due to the small average size of Irish game development studios, there is a significant shortage of junior-level positions. This results in most Irish graduates leaving the country for work or finding work in a field that is not games-related. Because of this, there is a loss of potential and future Irish talent, and, while some return, the vast majority of these juniors do not come home. In fact, it turns out they phone home, so to speak, seeking to pull yet more talent abroad. Graduates often call upon their alma maters when looking for talent. It would be beneficial to the educational sector, industry and economy if the jobs were available here.

2. Quality vs. Retention

Student retention is of paramount importance to game education programs. As such, within computer science and game development courses, schools are incentivized through funding to lower the difficulty level to retain students. To do this, some programs are moving away from modules based on a perceived “hard core” language such as C++ to the more user-friendly development environments such as Unity, Lua and Java.

Regrettably, this has the unfortunate effect of producing students that are less prepared for industry than they otherwise could be. In a survey of over 600 professional game programmers conducted by Brenda Romero, 95% of those programmers noted that they felt C++ was

the primary language that programmers entering the game industry needed to be proficient in. A mere course or two is not enough to develop proficiency. Interestingly enough, even game development companies actively developing in other environments such as Unity, Lua, Actionscript or Python, stated their preference was to hire a programmer who was skilled in and could pass a code test in C++. As developers noted, "We hire for the company and not the engine. Programmers proficient in C++ can move between various projects much more easily than those trained in a specific development tool." This is true for the game industry as a whole, not just the industry in Ireland. It was, however, explicitly expressed by many members of the Irish game industry. A quick search and analysis of open job positions, even for Unity engineers, will reveal that the requirements for the job more often than not require proficiency in C++.

3. Incentivizing Institutions With Challenging Curriculums

This is not to say that all programmes are adjusting their curriculum to ease dropout rates. In fact, at least two of the schools that I visited were doubling down on their C++ curriculum. It is not surprising that these were the same programs often mentioned by members of the Irish game industry as ones they consistently hire from again and again. The game industry desires a higher-level of employee, and there exists a perception among some in the industry that the game education sector turns out too many graduates who are not skilled enough to enter the industry. It is possible that the move away from C++ education for an industry which looks for graduates skilled in C++ has created this perception. Games, while being a fun pastime, are also among the most technically demanding products to great.

Ultimately, however, if it is the game education sector's desire to produce students well-trained for the game industry, programs that offer challenging curriculums should not be penalized through cuts in funding and thus incentivized to make their program easier, weakening the quality of their graduates. Programmes should be encouraged to develop challenging curriculum that produces amazing programmers that the industry can't get enough of. Programming is a challenging and difficult subject that requires intense skill and discipline. Conversely, games are something that lots of people want to make and game programs attract lots of people who greatly underestimate the effort required. If programming were something anyone could do, the positions would pay far less than the premium salary they currently command. Ireland has the faculty with the talent and desire to create great programmers trained for the game industry. They need not be assessed and penalized for trying to do so through retention analysis but instead rewarded based on placement of their graduates.

In order to improve retention, many programs are or have been advised to ramp their course such that students are introduced to programming and programming concepts through the higher-level languages such as LUA first before moving into the more challenging languages such as C++.

It is also noted that some programmes simply do not have the necessary level of students to embrace and thrive with a C++-based course. Furthermore, other programmes mix programming with design, aiming to produce game designers who can create their own titles. These programmes should, then, focus on the immediate hire-ability of the candidate and work to develop his or her portfolio with a primary focus on being the best they can be. Students should not, however, be led to think that the industry has moved away from C++ as its baseline “evaluation” language.

4. Lack of Software Programming Courses in Second Level Education

Educators in Ireland’s colleges face an uphill challenge with regards to technology and particularly programming. Since it is rarely taught in the second level, college programmes are responsible for bearing the whole educational load. It is akin a student entering a college English program who doesn’t speak a word of English but is expected to speak it well enough to get a job post graduation where that language is her primary tool.

As Ireland looks ahead to improve its workforce and grow its burgeoning technical industries, it is essential that it consider integrating programming into its early curriculum. The smattering of technology courses which teach people how to use a computer (word processing, etc) is not the same as teaching people how to build the software which runs upon it nor the foundational programming practices often cited by industry as “missing” or “not up to par.” This knowledge is critical to the success of the industry and the readiness of students entering third level programmes.

There are several private and non-profit programs which have risen to the challenge, notably CoderDojo. However, these programs are voluntary and not sufficient to dramatically lighten the load of universities. The vision is for third level institutions to build upon the work begun in the second level as they do with maths, sciences and the humanities. At present, where programming education is concerned, the colleges must bear the full weight.

While it is understood that revising second-level curriculum to improve technology education is non-trivial, particularly when it comes to teacher education and funding, there are a variety of initiatives that the government could take to encourage self-directed parents and children to prepare themselves for the technology industry (see *Technology Pyramid* in the Government section of this report).

5. Increase Focus on Foundational Programming Practices

A common refrain from the game industry was the need for institutions to integrate more foundational programming principles into their curriculums at a deeper level than many. Examples cited repeatedly were the following:

- The importance of debugging (which the junior programmer will spend plenty of time doing)
- Coding in small increments/testing
- Teaching popular and important algorithms (such as A*)
- Design patterns
- Program architecture
- Foundational languages like C and C++
- Focus on applying theory

In addition, game development students in all disciplines should become versed in the use of standard code and asset repositories such as SVN or GIT as well as standard bug-tracking software.

Enough students without sufficient experience are applying for jobs, and this is leaving an impression on the majority of game developers such that they felt a need to vocalize it during the meetings held in the early days of the research for this Fulbright. While these applicants should not be considered to be reflective of any one institution or even a country's students in particular, an impression is being left that students are coming out of college without enough foundational experience in the desired language of the industry (C++) and are instead applying for jobs "above their grade" when their knowledge is limited to Java and web development. It is important to note at this juncture that in probing deeper, this issue seems to be existent enough so as to make an impression. At the same time, however, programs which are primarily focused on creating students proficient in C++ are not having issues finding placement for their students nationally and internationally. Furthermore, it is necessary to note that in her own experience placing graduates with a variety of programming skills (some proficient in C++, others in Unity, others in Actionscript), it was notably more difficult to find openings for programmers without C++ experience in the United States as well. Even teams that are building in Unity want programmers skilled in C++.

6. The Rise of the Tool-Specific Specialist

In both meetings with educators and members of industry, some expressed concerns over students who are being trained as programmers exclusively in the Unity environment. This concern is not exclusive to Ireland. International colleagues have expressed similar concerns. While Unity is an excellent tool, students only produce what Unity allows them to produce. They don't understand the necessary foundational elements of programming. When teaching simply the tools all the students learn is how to use the tools, not how the tools work. Instead of providing a tool for students to use to create something unique, the tool constrains them within a space that they know how to work in. Students are not learning design or programming, but rather they are learning what Unity allows them to make.

It is advised to place tools within the context of a broader educational program. In the case of design, Unity is an excellent tool which can help them realize and apply the many design theories they have explored. Likewise, for students in a programming module, Unity can provide an important stepping stone toward the more challenging languages.

7. Facilitate Conversation

A recurring theme in conversations with both industry and academia was the lack of communication between the two. Industry rarely reached out to educators, and educators, likewise, rarely reached out to industry despite the fact that interaction between the two is of paramount importance to the success of the Irish game industry and game education sector.

While it seems obvious that this should be happening, initiating it rests upon the shoulders of two groups who are already keenly overworked. Numerous suggestions in this report attempt to bridge that gap and to make it a standard part of game development on both sides of the fence.

An ideal scenario would be to appoint a staff member whose primary purpose is to maintain industry relations, check to see what needs are and are not being fulfilled and keep abreast of industry internship and employment opportunities.

8. Establish Industry Advisory Boards & Greenlight Panels

Industry advisory boards are an excellent resource for game education programmes. As an example, UC Santa Cruz's advisory board for its Masters of Science in Games & Playable Media program has an impressive and diverse advisory board composed of programmers, business people, artists, composers, educators and game designers. In assembling this board, available here <http://gpm.soe.ucsc.edu/advisors/>, the goal was to create a group of people that prospective and current students feel is, in part, a reflection of them.

In general, advisors provide "light touch" support to academic programs by answering surveys, participating in student product evaluations, giving talks and providing feedback on curricular changes. Want to know if a particular programming course is applicable in the game industry? Send an email to your advisory board. Some institutions host yearly retreats onsite and online to make certain their students are, in fact, meeting industry expectation.

This is not to say that industry should be allowed to direct game education, particularly given that curriculum is revised every 5 years and skills that seem critical one year (ActionScript 3 and the now canceled ActionScript 4) may be completely irrelevant two years later. By creating regular communication between industry and academia, institutions are better able to prepare their students and advisors to gain a better understanding of what is involved in a well-rounded education experience.

In the case of Irish game developers, no generational knowledge is gained when graduates take jobs overseas. Many do not return except for vacation, and as such, veteran knowledge is in exceedingly short supply. In established game development ecosystems, those in the early years of their career are mentored by second- and third-decade developers (those with 20+ and 30+ years experience in the game industry, respectfully). By inviting them to participate as advisors in these programs, some of that critical knowledge can find its way back.

Following the Fulbright, Brenda Romero has been connecting institutions desiring advisors with advisors from the game industry both in Ireland and abroad.

In conjunction with industry advisory panels, institutions are encouraged to use green light committees in the approval of student capstone projects. In a typical green light process, students (or student teams) prepare a range of product pitches, typically two to three, which provides an overview of the game, its core loop, features, tech and team. The green light committee then evaluates the various concepts and approves one project to go forward or refuses to green light anything and instead makes recommendations for a resubmission. This is a standard process within game development and happens at all levels of the industry.

Green light committees are often composed of industry advisors, faculty visiting from other classes and graduate students (if the course is for undergrads). Advisors are invited to come back to provide regular feedback on progress at key milestones such as alpha.

Green light committees have the obvious benefit of helping students control both the quality and scope of their idea while adding valuable insider input into process and the module overall. Students are also exposed to industry talent early on and benefit from those early contacts when it comes time to seek a job.

9. Evaluate Goal-Related Modules

In offering classes that are deemed to be “what is needed by industry”, institutions are encouraged to check with their advisory boards or local industry to determine if, in fact, the courses or material being taught are used often in industry. As a case in point, some programs are still teaching unit testing as something that is standard in game development. It is, in fact, rarely done. A large AAA-game would employ build engineers to create unit tests, but by and large, this is something that is rarely done in traditional, non-AAA game development. Build engineers who create unit tests are, in effect, the first line of defense in a QA strategy. A gameplay programmer working on a combat system, for instance would not create a unit test for his or her code. Another example, previously mentioned, is the focus on long iteration windows and “user stories” in agile development. Developers are much more likely to use core design and hit the traditional industry milestones of alpha, beta and launch.

10. Fund Educator Training in Game Development

Particularly impressive during the Fulbright visit was the amount of teachers who had sought out, financed and secured training on their own for the betterment of their students and their programme. Multiple educators, for instance, had taken courses in Agile development and were using this in the classroom. While this is fantastic and speaks to the educators' desires to help their students and programmes succeed, the courses most educators are taking are not specific to the game industry. Therefore, while the courses in Agile development are useful, the game industry widely uses a modified version of Agile which emphasizes rapid iteration (usually one week to one month), de-emphasizes the notion of "user stories" and pushes toward polished product or MVP, depending on the nature of the product and its end market (console vs browser-based, in this example).

Of particular need are training modules in the following subjects:

- Game industry project planning
- Project costing
- Game design from a core and core loop
- Game mechanics and design patterns
- Game start up fundamentals
- Design documentation
- Modified Agile / SCRUM development
- Level design
- System design (economics, system inter-dependence, etc)
- Student portfolio design

It is the recommendation of this report to either fund or approach the Fulbright about providing another grant to fulfill these needs.

11. Fund Educator Travel to GDC in San Francisco

In terms of educator training and networking, the single most important event of the year is held each spring in San Francisco, CA. The Game Developers Conference, of which the Game Education Summit is a part, draws between 25,000 and 40,000 game developers and educators each year. During that week, hundreds of talks are given on game development in a variety of tracks, design, programming, art, production/business, as well as a number of summits, the Game Education, Audio, AI and Mobile summit among them. This conference quite literally provides a semester's worth of education in a single week. It also provides educators, and thus their students during class showings, with access to the GDC vault, a treasure trove of lectures from GDCs past. It also provides focus on trends in the industry and allows educators to best prepare their students for where the industry is heading.

GDC costs \$1495 USD for the early bird all-access pass (regularly \$2095 USD). Coupled with airfare and lodging, these costs are prohibitive to most programs. However, if each program were allowed to send one faculty member, that member returns with not only the contacts gained, but access to the GDC Vault. The importance of this event in terms of game development cannot be understated. There is a GDC in Europe, but it pales in comparison to the main event in San Francisco.

12. Place Priority on Portfolio

Game programmes are primarily created with the sole purpose of getting their students into the game industry. It is, of course, understood that there are scholarly paths one might take. However, at this point, the majority of entrants into game programs in Ireland are doing so because they desire a career in the industry or one which ultimately ends up in the industry. To do that, students need an impressive portfolio of projects they have created throughout their coursework.

The contents of a candidate's portfolio is a crucial deciding factor in whether or not they will be hired and as such, portfolio work should be emphasized. Students are encouraged to work on their portfolio both so that they have experience maintaining the site and so that they have something polished to show at a moment's notice. By making classes project-oriented you both teach applicable production skills as well as giving students content to use in their portfolio.

Therefore, thinking in terms of module outcomes, it is advised that programmes think toward a portfolio piece as an outcome and/or a capstone of each module and of the course itself. This is not to suggest that the course or modules need to change their content. Rather, it is asking programmes to consider the possibility of there being portfolio-related output for any given exercise. For instance, consider a Physics module in the programming track. It is possible that the outcome for a given assignment could be to apply a force to Object A and see its reaction. Thinking in game terms, this exercise could instead be reframed as a puzzle mechanic. In doing so, nothing is lost in terms of the meat of the assignment. However, the student has gained a portfolio piece which makes him or her a better candidate upon graduation. Another example is replacing essays with playable analog prototypes illustrating the same concept.

Portfolios which have online playable games with video of game play have the best chance of being favorably received by portfolio reviewers.

Many major game programs offer a specific course or a series of seminars designed to help students build their portfolios. It is recommended that institutions make students aware of this necessity, provide sample portfolios of recent students from their programme or from other leading programmes and use the "priority on portfolio" approach to give students the

most applicable portfolio possible for the game industry. The earlier students are aware of the need for a portfolio, the sooner they can begin working on it.

As a note, during the course of Romero's Fulbright appointment in Ireland, students were advised to begin work on their portfolio at their earliest possible opportunity. Opportunities for summer internships and part-time jobs go to those who have their portfolios ready for viewing, not those who have to take a week or two to put them together. Another advantage of putting a portfolio together early is that it allows students to see just how empty their portfolio presently is versus other students. It directs their learning and drives them to complete more projects.

Portfolios are a requirement of the game industry. Some companies such as Blizzard even offer guidelines on their sites (<http://us.blizzard.com/en-us/company/careers/university.html>).

13. Offer Code/Art/Design Tests Early

In evaluating how programs test their students' readiness for the game industry, none offered industry standard code, design or art tests. A key criticism of some members of the game industry was that the game institutions were not readying students for industry. However, if both students and educators are unaware of the level they are expected to hit, it's not surprising that students are unprepared. In order to determine their readiness, industry standard code, design or art tests can be administered to students early in their 3rd and 4th year to see where they stand. This will prepare them for the tests that they will be taking soon and also indicate the level of coding skill that will be required upon their graduation. It is important that students are exposed to this in a practical way (as opposed to just hearing it from an educator). This will allow students who have the drive to prepare and better themselves.

- A collection of code tests as collected from game industry individuals can be found here: <http://bit.ly/1lawDhG>
- Design tests often ask students to "reverse design" a product by preparing a design document for an existing feature or asking students to design a new feature for a company's existing game.
- Art tests often ask students to create a character, scene or concept which is in keeping with the product for which the company is hiring.

These tests are generally timed. Coding tests are also often administered onsite, timed and sometimes entered into a word processor. In that way, students, not the compilers, are expected to catch programming errors.

14. Create Game Labs

One of the more common challenges of game programmes is getting their administration to take them seriously, particularly when it comes to investing in game labs for students to study

competitive products and stay abreast of the industry (or, as those not in favor of them would say “to play games”). Many students struggle to pay for college fees and expenses and are unable to afford the latest equipment, particularly when consoles run in the hundreds of euros and games cost €40-50 each.

Game labs, at a minimum, consist of spaces that students can meet, play and construct games. Traditionally, they contain the following:

- Large screen television (42” or better)
- Game consoles, new as well as historic systems
- Video games
- Board games
- Computers for testing student projects
- Game book lending library

In looking to set up a game lab, much can be done by contacting Microsoft Ireland for loaner units and reaching out to the local community to ask for donations of old systems and used games. Brenda Romero has offered to reach out to her contacts in the game industry for sample products, posters and the like.

15. Create Special or Current Topics Courses

A challenge with curriculum that is revised in a long-cycle (3+ years or more) is that it often struggles to keep up with the needs of an ever-evolving game industry. Key for a curriculum to keep pace with industry is to stick to the fundamentals while adding a special topics course to the existing curriculum that allows for faculty to teach topical courses desired by the student body or required by industry which are not met by the current, fixed curriculum. Special topics courses, by their design, vary from semester to semester and the goals are likewise variable and designed to encompass a wide variety of topics. Institutions often use such courses to “test drive” a course before adding it to the curriculum or to cover material in demand at a particular time. Examples seen at game institutions in the past have dealt with game monetization, mobile games, wearable computing and narrative design.

16. Participate in or Host Community Events

In order to increase student exposure to game industry employers and to build their portfolios, it is recommended that universities host or make space and funds available for regular game jams and hackathons. One such event is the Global Game Jam held yearly in January in 480+ places which create games in a single weekend. At present, there are two Global Game Jam hosts in Ireland: LIT Tipperary and the Dublin Global Game Jam (<http://globalgamejam.org/2015/jam-sites?title=&country=IE&locality=>). These are standard events at most leading institutions. Game jams are an excellent way to improve game development skills, create pieces for one’s portfolio, and network with other game developers.

According to Ian Schreiber, a founder of the Global Game Jam, last year, at least five IndieCade finalists originated as Global Game Jam games. Furthermore, companies will often use these jams to scout for talent as the result of a jam is a clear indication of an individual's skill.

At a game jam, participants come together to create a video game (although board and card games are welcome, too). Attendees rapidly prototype their projects around a single theme which is not revealed until the start of the event, and all teams have the same amount of time. Games are uploaded to the Global Game Jam site upon completion of the event. Participants are encouraged to be creative and develop experimental games that innovate around a particular theme.

For information on game jams, check <http://www.gamejamcentral.com/>.

17. Opportunities in Game Education

At present, there are five fields in game development for which there is significant need for knowledge but in which people are not being trained. These fields are as follows:

- **LiveOps / DevOps:** Games that include a server component require not only a server programmer, but a DevOps person to handle the nitty gritty of server creation, setup, maintenance, and all the critical infrastructure operations demanded by networked games. Because of the complex nature of DevOps, it is not generally part of a Server Programmer's job. DevOps work has a foundation in advanced Linux administration.
- **Server programming:** Games are increasingly online experiences or include an element of network connectivity, whether it be for high scores, in-game purchases or to play online with or versus another player. All of these game features require server programming. In fact, the hardest programmers to hire at present are server programmers.
- **Level design:** The most important character in a game is the world itself. However, few programmes adequately address the topic of level design in any context, be it 2D, 2.5D or 3D. There is an opportunity within an art- and design-based curriculum to offer courses or an entire module in level design. There are exceedingly few level designers in Ireland.
- **Game production/Product Management:** Producers and product managers facilitate the successful development of a product by serving as a hub for all functional leads (programming, design, art and audio). Within non-game technology companies, product managers serve a similar role while regularly directing the product's high-level design. While a growing industry may not be able to absorb graduates trained in specifically game production or product management, this topic does not appear to be addressed in current curriculum. It is a need on the horizon, useful for all game developers and a growing industry.

- **Game Business:** While there exists a perception that game developers will graduate from college and enter the market as a startup, there exists very little in the way of the critical knowledge necessary to do that. The inner workings of game publishing, monetization and costing are very specialized to this space. Students are not being provided with this information.

18. Increase Experienced Industry Educators

A common challenge in game education is attracting educators who are also industry experienced. While every institution with whom Romero met would like to hire someone from the game industry (or *more* faculty from the game industry), it is quite challenging to do so. This challenge isn't unique to Ireland; it is an issue worldwide. The game industry pays more than education (a creative director can earn in excess of €120,000 per annum and programmers can earn upwards of € 150,000 per annum) and the number of game developers who are qualified to pass through the MS, MFA or PhD entry requirement are few and far between.

There are, however, more and more game developers making the leap into education because it affords them a better lifestyle and a chance to pursue a viable side career as an indie game developer. It is often the case, however, that game educators looking for staff and game developers looking to jump into teaching don't have a single point of convergence. Instead, game developers often ask other game developers how they got into teaching (Romero receives approximately one to two requests a month), and institutions advertise in places such as the Journal of Higher Education which are unlikely to attract those within industry.

In order to increase the number of industry-experienced faculty, institutions may consider the following:

- Lower the "PhD wall" by allowing exceptionally experienced candidates to use experience in lieu of degree as a credential. Notable examples of educators without PhDs are Richard LeMarchand at USC, John Romero at UC Santa Cruz, Ian Schreiber at RIT and Frank Lantz at NYU. Other institutions work with game developers to assist them in completing their degree.
- Consider allowing experienced educators to distance teach via GoToMeeting or pre-existing distance education software currently supported by the university. The scheme is similar to an online course, except students are physically present at the institution and the developer is resident in another location. As an example, Clarkson University in New York has offered a course online with game developer Tom Hall teaching from California.
- Host seminars with industry experts with specialized knowledge that benefits students in the program. An excellent example of this is DIT's audio design seminars which are hosted annually. Other programs offer master classes

- Advertise in publications targeting the game industry such as gamasutra.com, the IGDA's regular newsletter or, better still, connect with existing game developers and invite them to share news of your opening within game development circles.

19. Set Appropriate Expectations

Students and some faculty lack awareness (awareness that's not easily obtainable, mind you), about how long it takes for the game developers to get the necessary knowledge and skill post graduation to become successful in game development. When students were asked to guess how long it generally takes well-known game developers to hit it big, the answers were typically in the two- to five-year range. The reality is closer to ten years, and for many, "hit it big" never happens. However, they are rewarded by doing what they love to do for a living.

The result is that students have skewed expectations about what it takes to succeed in the game industry. Unable to secure a junior-level position, students become disillusioned shortly after school, struggle to get a job in a technical field and assume that their careers as game developers have come to an end before they even started. They may jump into a startup straight out of school, struggle due to lack of business knowledge or, in some cases, sell their ideas short giving away tremendous equity in good ideas in return for little investment. Naturally, others succeed, but they are rarities both in Ireland and elsewhere. Those who succeed have often been developing games long before school, and their education was a part of their overall game development trajectory.

During the course of the author's Fulbright appointment to Ireland, however, students were advised to think of their careers as game developers in terms of a ten-year plan. Due to the lack of junior-level positions in Ireland, students may have to seek employment with other agencies that are not involved in games to polish their skills until they become mid-level and therefore recruitable targets within the country. If working outside the game industry, however, students should be encouraged to continue to improve technically while coding and creating games on the side. Notable examples of this are the early id Software crew who developed products by day at Softdisk and worked evenings and weekends on their own projects, ultimately leading to the creation of id Software and hits like Commander Keen, Wolfenstein 3D, DOOM and Quake.

20. Educating on Roles vs. Fields

At present, game education is segmented along several different tracks: game design, level design, game programming, game art, game animation and game audio. These are very broad fields which contain many specialties. These specialties and the division of interests within the game industry is generally not being taught within game education in Ireland. For instance, consider the role of game designer. In hiring, it often breaks down into these roles:

- System designer
- Technical designer
- UI designer
- Level designer
- Narrative designer
- Combat designer

Each role has its own specialties and set of needs which must be addressed by education. Each is on the spectrum of "designer," but some approach the technical or artistic end of that spectrum. The same is true of any discipline within the game industry. Educators and students are advised to regularly explore job listings for entry level positions within the game industry both in Ireland and abroad to see what requirements these jobs have. Jobs that were non-existent in terms of hiring 10 years ago (Technical Designer, for instance) are now commonplace. Awareness of the requirements and the changing needs of the industry are paramount to adequately prepare students for entry level positions.

Institutions can also offer courses in game industry history or provide students suggested reading material which covers the different roles available within disciplines.

Another excellent example of this are conflicting definitions of the word "generalist". To educators and the academic institutions a generalist education consists of a sampling of all the disciplines associated with game development and the result are students who have some design experience, some programming experience, some art etc. However, when the industry says that they want "generalist graduates" they mean a proficient programmer who has experience programming in several specialties such as artificial intelligence, network programming, tools, gameplay systems (loot drops, quests, dialogue, etc.), or even some server programming .

21. In Code, Design

One of the most important roles in the game industry is that of the gameplay programmer. He or she provides the second-to-second gameplay that turns a design idea into something playable. As such, prospective gameplay programmers would do well to take courses in game design and game criticism so that they understand the design decisions they will be called upon to make and further be able to assess the success of their implementation.

In the review of design-related curriculum, educators are encouraged to teach students the principles of core game design, namely finding the core of the game - the one thing it is about - and how to create a core loop around that design. There are a variety of game books which address this topic from Tracy Fullerton's Game Design Workshop to Jesse Schell's Art of Game Design to Romero's own Challenges for Game Designers. A free series of articles on core game design can be found here: <https://bbrathwaite.wordpress.com/2008/10/15/the-core-of-a-game/>.

22. Competing on a World Stage

Ireland's Forfas report and subsequent reports make much mention of being a player on the worldwide stage. For game development curriculums, that stage is the Princeton Review, an independent ranking of game education programmes throughout the world. The Princeton Review analyzes programmes in a number of vectors that it then uses to determine rankings of one program throughout the world. When analyzing and evaluating their own curriculum, programmes intending to compete at this level should be aware of the things the Princeton Review examines.

The Princeton Review is broken down into four segments, as noted below. Questions listed below are excerpted from the Princeton Review and are for the purposes of analysis against existing benchmarks only.

- Academics:
 - Does the school offer courses in: Critical Game Studies, Games and Society, Game Design, Game Programming, Visual Design, Audio Design, Interactive Storytelling, Business of Gaming, Game AI, GPU programming and "game platform" hardware architecture programming, Graphics, 3D Modeling, Animation, Game Engine Scripting, Game Research (e.g. HCI, Playtesting, etc.), Music Scoring, Project Courses.
 - What degrees/certificates does your program offer?
 - What skills does the program teach: Art Creation, Level Design, Software, Visual Design, 3D, Object-oriented programming, AI, Software engineering practices, Graphics, Hardware Architecture.
 - How many game-related courses will your school offer during the academic year?
 - Does the school host an annual academic gaming competition, showcase or symposium?
 - If the school's students have entered outside competitions and festivals, have any placed or won?
 - Which competitions/years?
 - Does the program use a team-driven approach?
 - Are students paired with other students from different disciplines?
 - Is there a requirement for students in your program to have created a functional game before graduating?
 - What kind of research, if any, are your students involved in? Course-based research, paid research assistance-ships, internal student research grants, independent study project work.
- Faculty:
 - What percentage of the total gaming faculty have started, run or worked for a game studio?
 - What is the number of total gaming faculty?
 - What are the number of departments represented by gaming faculty?

- What is the percentage of faculty with PhDs
- Percentage of those gaming faculty with PhDs
- Percentage of total gaming faculty with tenure track
- Does your faculty have funded research in game design?
- How many graduate/undergraduate students are supported by funded research in game design?
- List up to five of your institution's most prominent faculty and their titles or fields of endeavor prior to joining to your program
- Infrastructure
 - Does your school offer game labs for students to use?
 - If yes, how many labs?
 - Does your school offer a game library for students to use?
 - Does your school use proprietary technology that is licensed for academic use?
 - Which technologies or engines does your school use utilize?
 - Discuss 3 of your school's distinguishing facilities and/or infrastructure?
- Career
 - Opportunities available for students: internships, paid internships, opportunity to consult for game design companies, portfolio review, portfolio development with professionals, internships recruiting events, student-led mods, team-based classes.
 - What percentage of last year's graduates have take a job in some aspect of game development at the time of or before graduating?
 - How many students has this program graduated since it started?
 - How many different game development studios have hired your graduates?
 - List your institution's most prominent alumni and their titles or fields of endeavor.
 - During the previous year, how many game companies visited your school for any of the following reasons: recruiting, lectures, seminars, demos or collaborations?
 - What was the mean base salary of the graduates who had accepted employment by 3 months after graduation?
- About the Program
 - What else should we know about these programs/class offerings?
 - What features do you consider to be distinguishing aspects of your program in game design?
 - What are some special or non-traditional aspects of your program?

Industry

Summary of Findings

1. Ireland currently has an excellent, engaged game community and the potential to become an industry hotspot.
2. The worldwide gaming industry is currently in a period of rapid change, spurred by new devices, faster internet, digital distribution and smaller teams.
3. Game development companies spawn new companies in their wake, and this process has contributed to the rise of many major game industry hotspots.
4. Investing in companies to get them “off the treadmill” leads to the growth of new IP and the potential of higher company valuation, leading to acquisition or IPO.
5. Provide a better investment environment by educating investors on opportunities in the game industry.
6. Irish developers are stuck in a deadlock between wanting funding for projects based on an idea and having a prototype to secure funding for their idea.
7. Ireland needs to have representation at international game conferences if it is to raise the global perception of and awareness of its industry.
8. In order to prevent the industry’s continued brain drain, Ireland needs to grow its existing industry to provide more junior- and mid-level positions within its game companies and find a means to lure game industry veterans back home.
9. Incubation and Accelerator spaces are critical to continued growth of the industry.
10. Mentorship is needed and can be encouraged through sponsored expert visits and increased support for national conferences.
11. In addition to Games Ireland and its initiatives to improve the business environment for game developers and support centers, Ireland may benefit from an additional developer-facing group focused on growing the community (IGDA was present until 2013, and regular gatherings frequently occur).
12. Communication between educators and industry needs to be facilitated and improved to build a stronger industry.
13. International game conferences are an important resource for game professionals and it is recommended that funding be organized in order to increase Irish attendance.

Analysis of Findings

1. An Active, Engaged and Passionate Community

It was evident from the very moment the Fulbright research began: Ireland’s game development scene is engaged, passionate, dedicated and incredibly well-networked. It is ready, eager and waiting for that moment of big breakthrough when it will be compared with internationally-known hotspots like Sweden, Austin or Montreal. It is hungry for mentorship and edu-

cation and eager to grow. It is bustling with dozens of small companies and hundreds of developers all keenly interested in the success of the industry as a whole, aware that success for one can lead to success for still more and at an accelerated rate. Ireland's game developers immediately come across as incredibly passionate, with the feeling of a group whose cresting is imminent.

In communities where game development is well established, such as San Francisco and Seattle, the communities have matured. Those mature hotspots have grown beyond some problems that Ireland's developers face. Yet, with that maturation has gone some of that feeling of community and of hunger, particularly in the Bay Area where the sharing of ideas among developers is often suppressed by NDAs and meetings are, to quote a fellow developer, "heavy on students and very light on actual developers."

It is the belief of this specialist, that Ireland's game industry can become the next hotspot if:

- It is supported by its government to create favorable tax and investment protection schemes similar to those found in the UK, France and Canada
- It is supported by an investment community that is also supported by its government and gives Irish game developers the ability to create new or leverage existing Irish-owned IP
- It is supported by the educational system that provides it well-trained graduates of high quality and, in turn, the industry itself provides the educational institutions with internships, training and regular needs analysis
- It is supported by government associations to provide aggressive benefits to individuals and companies looking to relocate to Ireland

As charged up as the local industry is, there is also a lingering sense of pessimism and weariness that the government will not deliver upon its own goals to make Ireland the games hotspot it knows it has the potential to become, particularly while neighboring countries work hard to improve their development and investment climate.

2. A Time of Massive Disruption

It is a time unlike any other time in the game industry. Throughout the industry's history, while computers and consoles changed every few years, much stayed the same. The graphics arms race was on (the desire to achieve a life-like fidelity in games) but otherwise, changes were relatively manageable. Within the last 5 years, however, massive disruption has occurred:

- A worldwide recession dampens everything: From investment to consumer spending, the bull lost its horns.
- Mobile is the new "handheld": Where before Nintendo ruled the handheld market, all that changed with the launch of the iPhone in 2007 and widespread smartphone acceptance by 2009.

- Broadband internet is the norm: Players download their games to their phones or computers. Fast internet allows them to play with friends online.
- 40-year-old women are the core demographic: With the rise of casual and social games, the core demographic shifted from a 30-year-old man to a 40+-year-old woman. Genres thought “extinct” like adventure and hidden object games are booming.
- Digital distribution is the norm: Going, going and almost gone were the traditional game retail outlets. Instead, these outlets were replaced by Steam, Apple, and other on-line distribution companies.
- Free to play and “DLC” are the norm: Spending \$59.95 for a game was once common. Within the last 5 years, monetization models have dramatically changed and developers adopted free or low price points to compete, making their money from in-game sales, ads or other unlockables.
- Web displaces AAA: Where before the biggest games came from the game industry and could be found on consoles, games like FarmVille, War Commander and Kingdoms of Camelot rose on Facebook and came from developers in the web space and their \$1M-a-day revenue caught the industry by surprise.
- Indie displaces AAA: One after another, AAA game development studios laid their employees off and downsized or closed while small, independent game developers continued to grow. Companies like Rovio, King, Riot and Mojang, propelled by the other disruptions, had revenue never seen before in the casual market and eclipsing the revenue of the AAA market.
- AAA doubles down: The AAA space cultivates in-house “indie” teams (*Hearthstone* at Blizzard and *Entwined* at Sony, for example), while adding never-before-seen levels of immersion and polish to its key franchises.

3. The Ecosystem of a Game Dev Scene

There are various game development hubs in the world that people regularly refer to: San Francisco, Boston, Dallas, Austin, Montreal, London, Paris, Vancouver, etc. Looking at all game industry hubs presently in existence, one can trace their histories and growth back to single individuals or companies. For instance, in the Baltimore area, the pairing of Bill Stealey and Sid Meier led to Microprose. From Microprose grew a wide range of companies. Likewise, Dallas became a stronghold for first-person shooter developers because of Apogee Software/3D Realms and id Software.

The growth and diversification of the game development scene in a given area often comes from large companies breaking up into (or spawning off) a number of smaller companies, as was the case with PopCap Ireland. In order to grow a development scene, Ireland must support and help grow its companies actively engaged in game development. From those companies, other game development studios will grow. The larger the pool of experienced developers, other forms of support being equal, the more game development companies there will be.

While Ireland has proven a successful home for large call center or QA institutions, those companies have not the required concentration of developer strength to be able to form new companies should they break up or otherwise leave the Irish scene. These companies are, however, necessary to the success of a game ecosystem.

4. Understanding the Treadmill

“Treadmilling” is a term used by those in the game industry to discuss the life of most game development companies. In fact, “getting off the treadmill” is a common refrain and goal. To illustrate, imagine a group of game developers that succeeds in securing a contract to produce, say, a mobile version of the game Civilization (this example is meant to be illustrative only and not reflective of an actual transaction). The group receives money from game publisher 2K to do this. The contract provides for €300,000 to port the existing game to mobile devices. The actual developer cost is closer to €250,000. In theory, this leaves the developer €50,000 with which to develop their own projects or to survive, as is more often the case, until the next contract comes along. This money is often used up due to product changes or delays and is rarely enough to lift one from the treadmill.

Many developers, including well known ones in the United States, exist on this treadmill, moving contract to contact, adding value to someone else’s IP while hoping to make enough money from the contract or on the royalties to be able to at last afford to develop their own game. Regrettably, those royalties are often used to pay back the “advance” given to develop the product. As such, developers become dependent upon publisher contracts, generate no new and valuable IP, and when those contracts dry up, they company as an on-going concern is done. This is a means to create developers with development experience, but not a means to aggressively grow an industry.

Successful game developers need a means to get off the treadmill and develop their own valuable products with the experience they have gained. Getting off the treadmill means growth and an ability to make room for junior-level talent while also opening up positions in mid- and senior-level spots.

5. Invest in Success and New IP

Ireland’s successful game developers need to be further encouraged by investment, tax incentives and grants to grow. Critical growth in a company comes in the form of developing its own products and IP. The value of any game company is in the IP it owns and the technology it possesses. It is the success of the IP which attracts further investment, acquisition and licensing. While “acqui-hires” are a thing which happens, it is creative IP-based growth that transforms a company (Riot Games, Mojang, etc) from a one- or two-person shop into a company that supports dozens if not hundreds of individuals. Giving proven companies the ability to move off the treadmill through a combination of tax incentives and investment gives Ireland

one of its best shots at success. The emphasis here on proven companies or individuals is intentional – these are the companies that have seen the full development cycle and are able to ship products. The more games people ship, the better they become – understanding the market, the challenges inherent in a particular platform, publishing models and lean development methodologies. It is from these individuals and companies that success is most likely to happen.

While Enterprise Ireland's High-Potential Start Up Unit supports a number of these established companies or companies with high potential to succeed, it would be ideal if these same companies could enjoy tax breaks, investment and grants that are received by their competitors in other countries.

Throughout the Fulbright research for this report, individuals in both industry and academia reported challenges in getting investors interested in game development while established companies noted that investors were interested. For this lack of investment, there appear to be three key reasons: lack of understanding of the games sector, prior financial commitment and lack of investor protection.

For some investors, the game industry was deemed trivial and not on par with other potential investments while others were unable to differentiate a good game pitch from a bad one, even if that pitch contained a fully-functional prototype. In fairness to those investors, many hit games do sound less than exciting in the abstract and are not likely to result in a \$2.5B acquisition years later. Furthermore, following the lead of investors in Silicon Valley, many investors have already made their bets in casual, social, mobile and are moving on to emerging game markets such as virtual reality and game-based learning. Lastly, games have not often been identified as good investments within the investment community in Ireland. Contrast that with active funds in the UK such as the Tesseract Interactive Fund which is currently in its fifth round (<http://www.eisa.org.uk/wp-content/uploads/2014/02/Tesseract-Interactive-SEIS-Service-4-Brochure1.pdf>). Furthermore, Ireland's neighbors offer tax benefits and protections for investors which are not available here. Both EI and IDA are investing within the sector, however, with multiple clients identified as high-potential start ups.

Some of the primary issues can be solved through educating investors. Eventually, an Irish hit game will do the work if nothing else. However, until a more favorable tax situation is presented, those willing to invest in games are likely to invest elsewhere.

6. Funding Expectation and Challenge

While existing game developers have a challenge in getting funding, those new to development or those who have yet to release a game have an even greater challenge. This is true not just in Ireland, but worldwide. In Ireland, however, this problem actually has unique, negative repercussions. These will be addressed in a moment. First, however, it is necessary to consider how independent games are traditionally developed.

Games such as Minecraft and Commander Keen (whose success funded games such as DOOM and Quake) had no external funding behind them. Rather, many developers save money and live as cheaply as possible. In other cases, developers work the proverbial day job and then work on their own time to create games or prototypes which are then self-released, picked up by or funded by publishers, kickstarters or private investment. Funding an idea, unless that idea comes from a developer with a track record, increases the risk significantly and is not common. Known AAA game developers get ideas funded. Even then, most have to spend significant amounts of their own money to create an art proof of concept.

In Ireland, however, the expectation that one should receive funding often prevents any development at all. This is catastrophic to a development scene. Developers' expectations are not without reason, though: *these expectations are fueled by grants and tax breaks that Irish developers see awarded to other game developers in EU countries* which have an arts view vs. a tech view of games and fund them as one might fund a film.

It is a reasonable expectation and one which is causing Irish developers to seek funding for their projects internationally. While this may seem to be a fine solution in the short term, it ultimately means that any successful IP developed by Irish hands on Irish shores will be owned in whole or in part by an international concern. Furthermore, the lack of grant funding toward innovative projects means that Ireland's most innovative thinkers will be forced to treadmill or "starve it out" until they hit success. Meanwhile, countries such as Canada, the UK and Sweden who are supporting their artistic communities will get further ahead and continue to be known as game development hotspots. Prospective developers are encouraged, however, to move away from the "ideas==funding" mindset and work toward creating prototypes before seeking funding.

7. Presence at International Conferences

In order to attract external attention, investment and development in the games sector, it is critical that Ireland make the world stage aware of the existing game industry in Ireland and its desire to grow that industry. Ireland has done this with big tech companies; the expertise is there. To do so, Irish games need to be present at GDC in a format competitive with other countries. Scotland, South Korea, Germany and the Nordic countries all have a significant and impressive presence at the Game Developers Conference.

Nordic Pavillion, Scotland booth, Korea Creative Content Agency (an agency affiliated with the



Ministry of Culture, Sports and Tourism) and Germany booth. Germany even has its own site dedicated to the event, their booth and the developers present. <http://www.gdc.german-pavilion.com/content/en/home/home.php>



UK Pavillon at GamesCom



Nova Scotia, Canada's booth at GDC

As has been noted, Ireland absolutely knows how to market itself on the world tech stage. Consider the Irish presence at technology events such as the Mobile World Congress in 2013, TechCrunch Disrupt and others.



#Ireland lunch is in full swing, spuds and stew, at the Irish lunch, hosted by @Entirl & @IDAIreland at #TCDisrupt

← ↻ ★ ...



So, while Ireland obviously excels in marketing itself to the tech industry, the games sector of the tech industry generally does not attend these conferences. Therefore, although Ireland is engaged with the tech space, the *perception* is that they are not engaged with the game space. Perception, of course, matters a great deal. Developers and publishers will not relocate themselves or start up businesses where they perceive there to be little industry and experienced talent to support continued growth. Likewise, developers are unwilling to relocate to a place they fear has little in the way of alternative jobs. Although the writer of this report is very involved in the game development community and an annual attendee at many game conferences, it wasn't until she began researching the industry for the Fulbright assignment that she became aware of the many companies, both SMEs and multinationals, that exist within Ireland, not to mention the offerings of Enterprise Ireland and the IDA. Investment attracts investment as Ireland has clearly done in other technology fields outside of games. While the work of the IDA in Silicon Valley is well known in the tech world, within the game industry at large, Ireland does not yet register as a hub or hotbed of game development. If Ireland is to best support its industry, it must in turn support associations such as the IDA and EI with additional resources and individuals able to best present Ireland at these international game events. Ireland has the marketing muscle to do this.

To be optimally successful, an Irish booth at a game conference needs to have:

- Large Ireland banners akin to those from the Mobile World Congress or Scotland's at GDC
- Stations upon which to play games which are manned by Irish game developers. Note that there are over 40 Irish developers attending GDC (40 have registered for a private party at the Romero's) who can schedule time to demonstrate their games
- Printed material demonstrating the existing success stories and game development companies in Ireland
- Printed material for companies looking to relocate to or start up in Ireland
- Meetings rooms

Ultimately, based on its showings at other technology events, Ireland knows how to sell itself. However, the audience it needs to reach doesn't en masse the conferences where it exhibits.

8. Brain Drain

The Irish game development scene has a persistent problem in regards to its brain drain. This problem is evident at two separate levels:

- Junior Roles: In speaking with a great many students, the majority hope to find employment in the industry within Ireland. However, because Ireland has few junior-level roles available, students are forced to seek employment in other industries, start their own ventures lacking the experience that would dramatically increase their odds or move

overseas. Those who come back to establish their own companies are few and far between.

- **Mid-Level Roles:** Those considering a return to Ireland or looking to advance to a mid- or senior-level role within a company often find those roles still occupied by a company's founders. Unable to grow, the founders are still largely "hands on" with the company's single project.

This creates a cycle in which there is a systemic loss of institutional knowledge. Those who leave the country or industry for higher-level positions take with them what they have learned while those who start their careers overseas never bring that knowledge back. Ireland's developers are forced to learn these lessons again and again. It also places a burden on those developers who do have this knowledge. Being an incredibly helpful community, developers who have specialized knowledge in Ireland often share that knowledge with those who do not. While a tremendous credit to the community overall, it nonetheless points to a symptom that need be addressed. In a game development stronghold such as Silicon Valley, employees come and go at companies all the time without leaving the area. The result is a rich ecosystem where many ideas and methodologies are exchanged.

Counteracting the brain drain is a challenging proposition. In order for there to be junior roles available, existing Irish companies need to grow and have the funds available to support such positions. As companies grow, they move their most experienced talent up the ranks while making room for junior and mid-level positions in the areas of design, programming, art and game production. As they grow further, they take on new projects making room for senior-level people.

At the junior level, various incubators such as the NDRC are doing their part to provide new developers incubation space and expertise. However, developers have requested still more incubation space.

9. Incubation Space

Members of the game industry expressed a strong need for incubation space which provided participants access to facilities necessary to develop (electricity and internet) at reduced cost or no cost. While there are examples of such space throughout Ireland, from the NDRC to space generously provided by other game companies such as Digit Games, again and again, game developers expressed a need for such space, particularly outside of Dublin. At the same time, there were also reports of space that was available which went empty due to lack of interest. This apparent contradiction points to both a lack of communication between those who provide the space and those who might use it or a lack of understanding in regards to what game developers desire in such a space (the reasoning being that if it were desirable, it would be gone).

A prime example of an emerging and successful space are:

- The Digital Hub <http://www.thedigitalhub.com>
- CoLab Letterkenny <http://www.idaireland.com/connect-and-invest/letterkenny/talent/co-lab/>
- Guinness Enterprise Centre <http://www.gec.ie>
- NUI Galway: <http://www.nuigalway.ie/business-industry/business-incubation-center/>

10. Mentorship

Mentorship was one of the most common challenges discussed by members of the game industry in Ireland. Many noted that mentors provided for them had not actually shipped a game themselves. As anyone who has shipped a game can verify, the specialized knowledge required to understand the marketplace, its monetization methods, and the discipline specific knowledge necessary to launch a game cannot be understated.

Mentorship takes an artist from good to great, it introduces designers to the finer points of game system balancing, it shows programmers more efficient algorithms and it teaches audio designers the finer points on contract negotiation. Mentorship is essential, and it is a normal part of any larger game industry and game community. Mid-level employees mentor the juniors while leads mentor the mids. In Ireland, however, there are simply not enough mentors to go around and due to its geographic isolation, it is challenging for Ireland's developers to get this consistent mentorship or make the contacts to do the same.

Mentorship is also critical to keep track of trends in the game industry. It is rapidly iterative. The methods and mechanics that work in one season have completely changed by the next. Monetization methods and platform standards change.

While mentorship will rise as a natural function of a growing industry, in the meantime, there are things that the industry and those who support the industry can do:

- Sponsor Experts: Institutions like the Fulbright and other educational institutions can sponsor workshops open to members of the development community. These workshops bring in external experts in areas which are most needed.
- Revitalize a Conference Scene: In the US and UK, regular conferences becomes gathering points for developers and exchange of information. Ireland lacks a dedicated, regular game development conference which offers any kind of mentorship at scale. In particular, the first two days of GDC in San Francisco host a series of full day or two-day workshops designed to be intensive mentorship experiences by industry pros.

In fact, Games Ireland identified mentorship as one of its key objectives noting that the industry suffered from "a shortage of sufficiently qualified candidates". Its objective states that "Games Ireland is pressing the government to fast-track visas for non-EU talent and also to

introduce tax ‘holidays’ and other incentives to attract these experts here in return for a binding commitment on each beneficiary to train up to five local employees.”

In order to facilitate mentorship, Brenda Romero has begun a series of talks, so far being held monthly, with specialists in various fields talking about their experience. To date, speakers have included Max Temkin (Cards Against Humanity), Sela Davis (Xbox Engineer), Ian Schreiber (RIT) and future talks will include Laralyn McWilliams (The Workshop), Seth Spaulding (Blizzard) and David McDonough (Firaxis).

11. More Representation for Indies

At present, Ireland has one association, Games Ireland, that speaks on behalf of game developers in Ireland. Games Ireland has waged a determined and persistent campaign to make Ireland a better place for game development (<http://www.gig2014.com/objectives/>), hosts conferences and has a sizable membership among the game support services. It is successful and has contacts interfacing with government agencies much like the Entertainment Software Association in the United States (<http://www.theesa.com>).

In many developed markets, outward-facing groups like Games Ireland are supported by inward-facing associations like the International Game Developers Association (IGDA) or another group specifically dedicated to regular game developer gatherings and community building similar to Boston’s Post Mortem (<http://www.bostonpostmortem.org>). The IGDA did have an active group up until 2013. However, according to IGDA Executive Director Kate Edwards, when the association did their roll call in 2013, the group claimed to be defunct. Its once-active Facebook page is likewise no longer active (<https://www.facebook.com/IGDAIreland>).

There are, of course, active developer communities within Ireland. They exist as member groups on Facebook, on forums (<http://www.gamedeveloper.ie>) and in the form of sizable groups that gather regularly such as Dubludo (<https://twitter.com/dubludo>).

It is suggested that Ireland develop a local, inward-facing group for independent game developers or align with an existing group which is inward-facing and can also speak on behalf of game developers to amplify and support Games Ireland’s effect. The groups already loosely exist. However, because they are “gatherings” vs. “groups”, there is no leadership, per se, that can speak for the group, address issues and speak on behalf of independent game developers to amplify Games Ireland’s efforts.

12. Increase Conversation with Academia

As noted in the Education section above, a recurring theme in conversations with both industry and academia was the lack of communication between the two when it comes to improv-

ing the industry in Ireland overall. Interaction is of paramount importance to the success of the Irish game industry and the game education sector.

Without industry connections, it means that many of the mentors students are exposed to have no time in industry and are teaching from peripheral experience, although these lecturers desire that experience. This problem is compounded by the lack of crosstalk between educators and industry which has given rise to a number of common misunderstandings such as the industry's use of agile development and expectations for "generalists." It is further complicated since game educators and game developers rarely move in the same circles, so to speak.

Within larger game companies such as Blizzard and EA, it is common to have a university relations team. This is likely not possible within smaller studios. That said, given the country's goals of improving its game industry and its game education sector, this issue must be addressed while respecting the fact that neither developers nor educators have lots of extra time on their hands.

Where possible, it would be useful if individual companies had a point person for education contacts. Further, it is recommended that the HEA or a similar body sponsored an annual event at which its game educators and its game industry could meet, discuss goals and challenges and identify needs and shortcomings for the future.

13. Lack of Funding for GDC or E3

Game developers frequently mention the importance of traveling to GDC in order to meet with potential clients and gain education and training. E3, the Electronic Entertainment Expo, is also frequently mentioned. For developers, however, the cost of traveling to these events, both located on the west coast of the United States, is often prohibitive. Developers seek full or partial funding to allow them to attend these events. Even among developers that have landed funding for their projects, setting aside €3000 for airfare and lodging can be cost prohibitive.

In lieu of such funding, fortunately, developers may consider attending GamesCom in Cologne, Germany which also simultaneously hosts the European version of GDC. Although the European version of GDC is much smaller than the main GDC, GamesCom is the largest game event in the world and is increasingly being attended by companies in the video game space.

If available, however, it would be ideal for some organization in Ireland to make available a certain number of passes for game developers with viable games or award-nominated games who would otherwise be able to attend.

Government

Summary of Findings

The focus of the Government section of the report is to address issues raised by game developers which have not already been widely discussed by government in its own reports and documents.

1. As is evidenced by their participation in this report, the Forfas report, its associations and its high profile trips to Silicon Valley, Ireland's government is engaged in improving its tech sector.
2. It is recommended that Ireland recommit to and pursue the recommendations of the Forfas report.
3. It is strongly recommended that Ireland create a document and companion site which directly targets the game industry and provides a one-stop-shopping informational site for game developers and publishers looking to locate a business or a headquarters in Ireland.
4. It is recommended that Ireland follow the lead of many other countries and include games in its arts funding.
5. It is important to correct the common perception that students are fully prepared to run a game industry startup straight out of college; successful startups more often come from those with prior industry experience.
6. Government can assist parents and educators by developing a "Technology Pyramid" that assists parents wanting to facilitate their children's programming education.
7. It is recommended that in addition to the large game companies, Ireland also target the small- to medium-sized game companies.

Analysis of Findings

1. An Engaged Government with a Positive Mission

Ireland is very well known in the Bay Area as the place for "headquartering big tech." It is incredibly impressive that the Irish government is engaged with its industry, its educators and the Fulbright Commission toward improving the games education sector and, as a result, its game industry. During the course of this mission, this report's researcher was able to meet with multiple government leaders, notably Jan O'Sullivan, Minister for Education, and had an extended meeting with Damien English, TD, Minister of State at the Departments of Education and Skills and the Department of Jobs, Enterprise and Innovation with Special Responsibility for Skills, Research and Innovation.

With an engaged government, a country's game industry can be propelled toward success, or, in the case of Montreal, practically created:

- **Quebec (Canada):** the government's tax credit pays 37.5% of employee salaries. <http://variety.com/2013/biz/games/tax-incentive-helps-montreal-become-videogame-central-1200005810/>
- **United Kingdom:** the government provides a 25% tax credit to video game creators. <http://www.theguardian.com/technology/2014/mar/27/ed-approves-tax-breaks-video-games-industry>, <http://www.develop-online.net/opinions/a-developer-s-guide-to-games-tax-breaks/0191020>
- **France:** the government provides 20% refund on development expenses for titles which fit its guidelines and a video game support fund among other incentives. <http://www.develop-online.net/news/france-gets-greenlight-to-expand-games-tax-breaks-for-more-devs/0201296>

These regions are just a sampling. There are other countries, provinces and states with packages designed to attract the industry, too. Ireland cannot stay its course and hope to be competitive in the global game industry when its neighbors are very proactively encouraging growth.

2. Realizing the Vision of the Forfas Report

The Irish government is well-versed on the findings of its Forfas report on the game sector and multiple individuals within government have expressed a desire to see recommendations of that report fully come to be. Following through on the recommendations of the report are critical for Ireland's game industry and its future growth.

The Forfas report and the drive to address the issues it identified seems to have lost the momentum it once had, however, and although Ireland's game development sector is engaged, Ireland is not experiencing the investment, notoriety, growth and funding it hoped its game industry would receive. In part, this is due to the same issues identified in 2011.

It is not the intent of this report to revisit the known issues in the Forfas report. Rather, this report strongly recommends the government push for delivery on the issues identified within it. The Forfas report identified six key opportunities for Ireland:

- 1 Developing an International Cluster - stimulating connectedness between related sectors, nationally and internationally.
- 2 Enhancing Skills and experience - addressing short term needs and building a continuous feed-stock of creative, technological and commercial capabilities.
- 3 Accelerating growth in creative content development - attracting and developing the talent pool - creating the dynamic environment.

- 4 Building International Visibility - raising Ireland's visibility as a vibrant location for the games sector.
- 5 Driving R&D and Innovation - incentivizing innovation within Irish-based firms, anticipating future needs.
- 6 Delivering Next Generation Broadband - underpinning future growth with the provision of widely available, competitively-priced advanced broadband services to homes and businesses.

Of particular interest is the report of the Cluster Development Team. A draft of this document has yet to be released.

3. Provide a "One Stop Shopping" Method for Interested International Game Developers & Game Companies

For game developers considering Ireland as a home for their businesses, whether home-grown or international, it is recommended that government provide some means for game developers to find out what Ireland offers at a glance. For instance, if this author's game company were interested in coming to Ireland, it would be useful to have a single reference point showing the benefits of doing so and pointing the way for further information. The IDA and EI have an excellent range of information and custom services available, but the availability of this information is not well known among game developers (although, ironically, the Silicon Valley area game developers do seem to think of it as an HQ for big data companies). Other than the initial press burst that followed the release of the Forfas report, it is recommended there be more outward, active engagement of the international game development community by the government. Lack of attendance at key game conferences perpetuates this image.

It is recommended that the Department of Jobs, Enterprise and Innovation and the related government bodies put together an online resource outlining all of the supports, incentives and grants that would be on offer to a game developer considering relocating to Ireland. This resource should then be distributed at key game industry events.

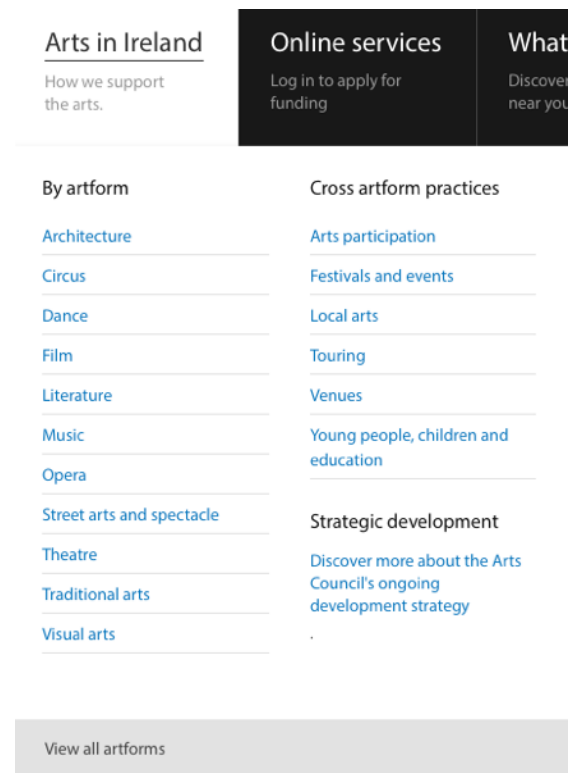
4. Games: Art or Tech?

Game developers, like filmmakers, seek funding on a project-by-project basis. As such, game development is seen on the funding fringe by those with money to invest or grant: not quite R&D or technology-focused enough for tech funding and not quite artistic enough to get arts funding. In fact, games are not listed as an art form on the Arts Council of Ireland's page and a search of the term "game" returns no results. This makes it harder for new companies to choose Ireland and harder still for them to flourish when other countries offer more favorable incentives for game developers. The Arts Council of Northern Ireland, for instance, recently funded two game projects. (<http://www.artscouncil-ni.org/news/44-projects-share-over-428000-creative-industries-funding>), and Northern Ireland Screen has recently appointed Donal Phillips, a game industry veteran, as its Digital Executive. Importantly, BAFTA has embraced games as one of its key pillars of the arts (<http://www.bafta.org/games>).

In Ireland, however, due to their nature, game developers often find themselves in the middle of two funding paradigms. Since games are seen as a product, as opposed to a platform or technology, they struggle to secure funding for work on a proof of concept. Likewise, because of the technical nature of their product, companies are unable to secure artistic funding for their work. Games are the middle children in the eyes of the Irish funding market. This also means that Ireland's game developers are unable to afford themselves of the tax breaks that may otherwise be available for artists.

5. From Education to Startup

In meetings with individuals in government and its business-related associations, there is a perception among some individuals that, on average, students will leave college to form their own game industry startups. While this does happen, it is not at all the norm within the game industry and statistically unlikely to result in success, particularly if the student has not successfully launched games prior to graduation. Metaphorically, it is the equivalent of a student leaving culinary school and opening his or her own restaurant. He or she is completely unequipped with the necessary experience and business acumen to successfully deliver.



The typical path for students post-college is to join a game company or a technology company in a junior role and work their way up through the ranks to a lead position. Having launched a few games and seen the business for themselves, these former students to strike out on their own and create a startup studio armed with their work experience and contacts. One can see this sort of trajectory within the present Irish game scene among its most successful game companies such as Digit Games and SixMinute Games.

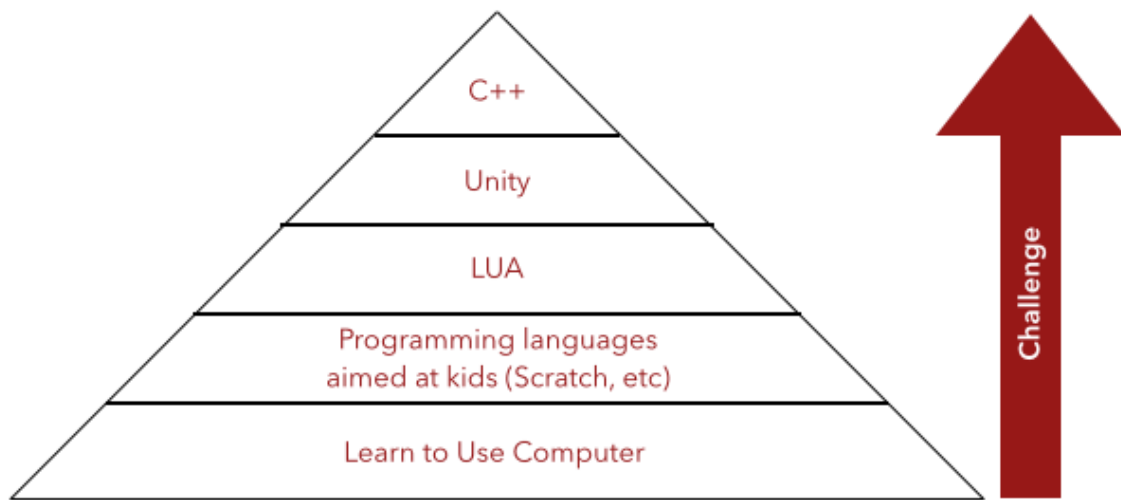
Promoting the perception that students are likely to succeed straight out of school, particularly un-mentored, can lead to a poor investment return, a softening of investor excitement within the sector and a diminishing opinion of the industry among the public and the the tech industry overall.

It is particularly important that the relevant parties realize that the success of Ireland's game industry relies on supporting and reinvesting in companies and individuals that have proven their worth through tangible, vetted prototypes or shipped games so that their companies may grow and provide those critical entry-level jobs needed by college graduates.

6. Create a Technology Pyramid

Although there is clear need for programming to be taught at the second level, there is neither the funding nor the expertise within the existing school system to do so in Ireland. On this, Ireland is hardly alone. Funding cuts to education are a common headline in the media worldwide and providing the necessary funding to train educators or hire computer programming specialists is highly unlikely. Though not available through school, many parents still wish to provide their children with information they know will be critical in the coming years.

To facilitate this, it is recommend that government work with educators and industry to assist parents who want to self-educate or direct their children. To do this, government could provide parents with a "technology pyramid" similar to the food pyramid used for years to educate children about proper food choices. A sample pyramid is pictured on the next page showing how parents might direct their children's education through online courses or printed references.



There are a great many resources online that teach children about programming, but parents lack the necessary information to define a starting point and could use some direction. What languages are good for those younger than 10? Scratch? Processing? Lua? What resources are there? This information is available, it merely needs to be aggregated and distributed to parents, schools and libraries and other places where children come into contact with technology.

Kids have a desire to use technology. We witness it in how much they play games and how comfortable they are on computers. To be tomorrow's success stories, children need to become fluent in the language of the future.

7. Direct Target the Game Industry

Ireland has been successful in targeting the large game businesses for whom an offshore data center makes sense. Blizzard, Zenimax, Riot, EA and Zynga all enjoy a presence there, and their presence is a direct result of the favorable business climate and the hard work Ireland's outreach agencies, namely the IDA and EI, have done in securing them.

Also of note was the Taoiseach's visit to Silicon Valley in June 2014. The Taoiseach met with technology leaders in the Bay Area, although to the best of this researcher's knowledge, Kenny did not meet with any game industry representatives. This visit nonetheless succeeded in getting the attention of Silicon Valley leaders and businesses.

In technology outreach, particularly in Silicon Valley, it is recommended that Ireland target the small- to medium-sized game development studios in addition to the larger studios and technology firms. There's a critical reason for this: to prove the business case for a AAA studio, one needs to know that there is an experienced *AAA game development* workforce at the ready. When that happens, more studios move in. For instance, in Montreal, the success of Ubisoft drew Electronic Arts. Without other AAA studios present, the business case is much

harder to make. For small- to medium-sized firms, however, the case is a much easier one, particularly due to Ireland's favorable business tax situation as well as its population of existing game development talent. So, while it is quite useful to target these students, particularly with regard to their call centers, QA centers and customer support centers, the small- to medium-sized market should not be overlooked. Ireland has significant talent at the ready and a vibrant game development scene which is more than capable of supporting multiple businesses. Ireland's remaining hurdle is making itself more favorable to funding by following the leads of and becoming competitive with the tax schemes, investment protection and arts funding of its neighboring countries in the EU.

Associations

Summary of Findings

1. As one of Ireland's two primary growth organizations, Enterprise Ireland has, overall, been a tremendous benefit to the local game industry.
2. Although well known within the tech arena, amongst the international *game development* community, EI and the IDA are not well known and could benefit from increased conference and marketing activity to improve their visibility in the international game development sector.

Analysis of Findings

There are many associations in Ireland designed to assist Irish and international startups and established companies in the games sector. To maximize their effect, improved tax, funding and arts grant schemes are necessary to make Ireland competitive for new game development in addition to headquartering of big tech companies.

As a part of the Fulbright, this researcher met with multiple groups including:

- Industrial Development Authority (IDA) (<http://www.idaireland.com>)
- Enterprise Ireland (EI) (<http://www.enterprise-ireland.com/en/>)
- American Chamber of Commerce Ireland (<http://www.amcham.ie>)
- Games Ireland (<http://www.gig2014.com>)
- Irish Software Association (<http://www.software.ie>)
- ICT Ireland (<http://www.ictireland.ie>)

Each of these groups has information on the internet for companies looking for their expertise, and some provide extensive information about their services and the opportunities available for companies both nationally and internationally. It is neither the intent nor scope of this report to reiterate all the services provided by these groups. Rather, it is the intent of this report to summarize the discussions had with industry and academia during the course of the Fulbright.

The two associations most often referenced were EI and the IDA.

1. Ireland's Primary Growth Organizations

Enterprise Ireland

Enterprise Ireland's reputation nationally and particularly internationally is impressive on the tech front, and its efforts along with the IDA's are often cited as one of the primary reasons for Ireland's spot among the Forbes' top countries in the world to do business (<http://www.forbes.com/sites/alisoncoleman/2014/01/23/how-irish-tech-entrepreneurs-are-rebooting-irelands-economy/>).

Within Ireland's game development community, there are a variety of opinions expressed. Those who have received EI funding and guidance acknowledge that without EI's assistance, their company would not be where it is and give the organization glowing reviews, "except the paperwork." The initial start up funding coupled with the HPSU funding provide an excellent advantage to companies developing in Ireland. At the same time, there is a perception that EI is more restrictive in funding than it used to be. This is in keeping with investment worldwide. The recession coupled with turbulent changes in the game industry and the increasing costs of user acquisition have made investors more cautious. Most have "made their bets" in the various game-related spaces (casual, core, mobile), and they are investing in other areas to diversify their overall portfolio. Where game investment is going strong, such as the UK's Tesseract Fund, investments are more protected. Local investors are risk-averse. As such, the bar for investment is higher than it used to be and funding that was once available no longer is. In order to stand the best chance of investment, not just in Ireland, but worldwide, and whether that investment be from individuals, funds, publishers or Kickstarter, an idea is no longer enough. Functional "proof of concept" prototypes are the lowest bar for entry and many developers are approaching publishers for launch/marketing funding with completed products on their hands, particularly in the mobile space where user acquisition is incredibly expensive.

Enterprise Ireland's offerings are well-documented on their site. It may be beneficial to host periodic open houses for game developers so that opportunities and processes can be made more visible and so that information about what it takes to submit for funding and get funded can be disseminated. Similar events at game industry hot spots such as Silicon Valley, Los Angeles, Boston, Seattle and Austin would likewise be beneficial. The game development community could possibly host such a discussion at one of its gatherings.

IDA Ireland

To best see a system, try to work within it. IDA Ireland provides a wealth of customized information to game developers seeking to relocate to Ireland. One such packet this researcher viewed contained detailed information on the Irish game and tech industry, curated office space information, solicitor information, city snapshots of the possible relocation options and even a listing of local schools for employees with children. IDA also offered an introduction to

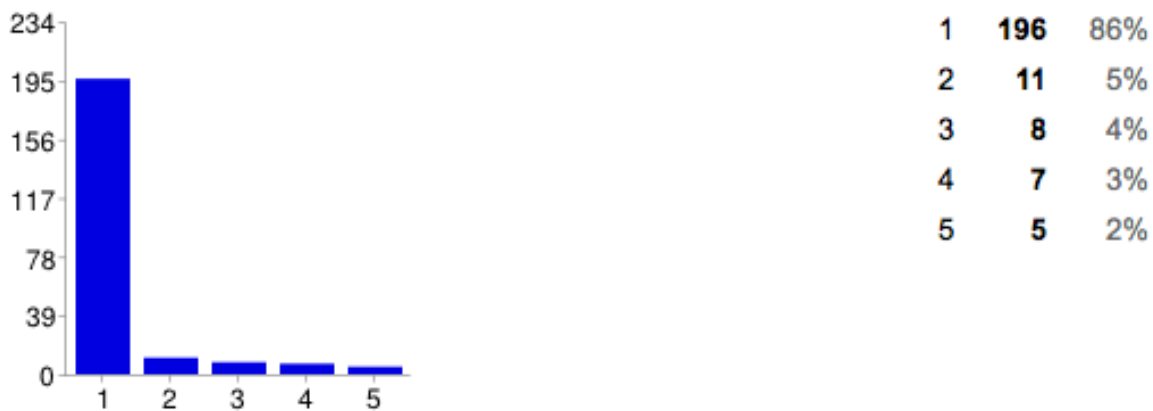
the local IDA office nearest the developer in their home country. It was impressive and customized service.

Since the focus of the research for the Fulbright assignment was on Irish companies and the indigenous game industry, however, the experience of those with whom I met was limited in terms of interaction with the IDA.

2. Improving International Visibility

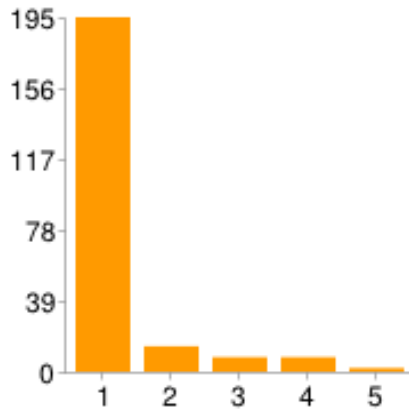
Within the international community, and as mentioned in the Industry section of this report, Enterprise Ireland is not nearly as well-known among professional game developers. In a survey of 224 professional game developers throughout the world, 86% of game developers had never heard of Enterprise Ireland, and only 2% noted they were “very familiar” with Enterprise Ireland. Of respondents that expressed familiarity with Enterprise Ireland, 45% were from within Ireland.

How familiar are you with Enterprise Ireland?



The survey referenced above may be viewed at <http://bit.ly/14bYZeq>. It is still live and collecting data.

How familiar are you with IDA Ireland?



1	195	86%
2	14	6%
3	8	4%
4	8	4%
5	2	1%

Like EI, the IDA has a wealth of information available to interested parties, and an obviously successful staff that has been able to land most of Silicon Valley and Seattle's biggest names. It is surprising how little is known about IDA in game development circles, however.

Within the international community, IDA fared similarly to Enterprise Ireland. With 224 professional game developers participating throughout the world, 86% had never heard of IDA Ireland, 2% were very familiar with it. Of respondents, slightly fewer Irish respondents were familiar with it at 42%.

While these numbers are relatively low, it should be noted that the IDA has landed huge companies within the game space from Blizzard to EA to Bethesda to Zynga. Among smaller developers, however, outreach, advertising and press within the international game development community may be beneficial to increase awareness. Brenda Romero is glad to make the necessary introductions.

Concluding Notes

Thank you.

Throughout the course of the Fulbright, I have been blessed to meet a great many wonderful people and spend significant time traveling to the far ends of an incredible country. I look forward to feedback, am glad to provide updates to this report and am willing to help Irish games in whatever way I can.

A handwritten signature in black ink, reading "Brenda Romero". The signature is written in a cursive, flowing style with a large initial 'B'.