In the first Video Game Theory Reader, Walter Holland, Henry Jenkins, and Kurt Squire described how the Comparative Media Studies (CMS) program at MIT was beginning to integrate game design into its humanities curriculum. The program had embarked on a resource-restricted journey to the frontier of video game theory: “Our students are working through games on paper, examining existing games, brainstorming future directions, and through this process, trying to address central issues about games and education.” The essay drew an analogy to the work by Lev Kuleshov and his students in the early days of film studies; without any experience or access to film-making equipment, they produced thought experiments and insights that came to influence a generation of Soviet filmmakers. Through the Games-to-Teach research project, CMS students generated game designs as a form of theory through practice. The program sought to supplement academic theories of games with more “vernacular” theories, asking its students to think through real-world challenges facing practitioners. The essay also anticipated a near future in which CMS and other academic programs would build the resources and expertise needed to turn prototypes into polished games, training its students to become
game designers, much as Kuleshov’s training paved the way for Pudovkin and Eisenstein.

The Games-to-Teach program evolved into The Education Arcade in 2003. Student researchers developed Revolution, an ambitious modification of the Neverwinter Nights (Bioware Corporation, 2002) engine that transported players to Colonial Williamsburg on the eve of the American Revolution. More recently, a partnership with Maryland Public Television began collaboration between students and professional development studios on a game designed to teach math and literacy to middle school students.

For CMS, the establishment of the Singapore-MIT GAMBIT Game Lab in 2006 marked the next leap in its continuing exploration between game theory and practice. Jointly created by CMS and the Media Development Authority of Singapore, GAMBIT is a five-year project to research video games, develop new and innovative games, and prepare students from Singapore’s universities and polytechnic for entering the games industry. The GAMBIT name describes the project’s many axes of inquiry: Gamers, Aesthetics, Mechanics, Business, Innovation, and Technology. Adhering to the principles of “applied humanism,” the conceptual core of the Comparative Media Studies program, GAMBIT translates research into practical application, testing theoretical precepts in contexts outside of academia. GAMBIT sought ways to move students from writing and studying games towards developing and testing playable games.

In the run-up to development, Jenkins described the laboratory as “a space where we can move swiftly from pure research into compelling applications and then partner with the games industry to bring the best ideas to market.” What follows is an analysis of the methods used by student and faculty researchers to build games in the academic context. This is also, in the spirit of video games, an attempt to hit a moving target. The pilot year saw tremendous experimentation with new methodologies, with continual testing, revision, and radical rewrites of design and development procedures. Embracing change, GAMBIT continually refines every process used in the lab. This essay does not have a universal recommendation for university-based games research. Rather, it is a snapshot of our own navigation through the unique challenges facing academic game developers.

Across Countries and Cultures: Singapore and MIT

The games of the Singapore-MIT GAMBIT Game Lab are merely its public face. Internally, the lab has the mission of furthering the strong research relationships between Singaporean institutions and MIT. MIT has a ster-
ling international reputation as a producer of scientific research, invention, 
and entrepreneurship. It is also both a proven incubator for new ideas and 
a proving ground for individuals who are encouraged to think differently. 
For MIT, Singapore is a partner that understands the importance of educa-
tion and research for economic development, willing to take calculated 
risks for potential rewards.

On the other side of the world, Singapore is a modern and technologic-
ally forward-thinking nation that has made substantial investments in 
education in order to position itself as a hub for technological industries in 
South-east Asia. Singapore students and researchers are methodical, tech-
nically proficient, and driven with a relentless work ethic that rivals the 
tireless reputation of the MIT student body. For Singapore, MIT is a gate-
way to high-level faculty and research conducted throughout the USA. For 
both parties, the partnership presents an opportunity for international 
cultural exchange.

The GAMBIT partnership is an initiative of Singapore’s National 
Research Foundation (NRF), tasked with the mission of identifying new 
economic opportunities for the country. Traditionally dominated by 
manufacturing and trade, the Singaporean economy has faced declining 
manufacturing numbers in recent years. Singapore’s neighbors in South-
est Asia have also created significant competition for international trade 
routes. As a result, the government of Singapore set aside public funds 
for research and development aimed at identifying and exploiting new 
economic strategies. An earlier research program centered on bio-
technology had proven to be successful, encouraging Singapore to launch 
new initiatives in other areas of research, with the NRF inviting proposals 
from universities across the world to fund collaborative work with 
Singapore.

By 2006, Singapore had clear, recognizable strengths in environmental 
and biological technologies. Both fields were highlighted for expanded 
research and funding. Interactive and Digital Media (IDM), however, was a 
significantly different challenge for Singapore. The past decade had seen 
several Asian countries carve out successful and lucrative niches across a 
variety of digital media forms such as animation and games. Japan, Korea, 
China, and India had all identified distinctive niches for themselves within 
global media flows, developing content that reflected their unique aesthetic 
and cultural traditions. However, despite having a competent and modern 
IT infrastructure, creative industries in Singapore were struggling to 
develop a coherent global strategy.

Despite the emergence of new digital distribution channels that pre-
seented new opportunities, Singapore’s nascent game industry had yet to 
understand how to leverage and market its strengths. The government of
Singapore hoped that a solid funding push in IDM research and development would allow Singapore to identify competitive advantages and attract strategic partners needed to push this industry to the next level. With a history of successful educational collaborations such as the Singapore-MIT Alliance (SMA), Singapore approached MIT with a cross-section of its national research challenges. The faculty of MIT responded with hundreds of proposals for collaboration, including one proposing a “games innovation lab,” authored by Henry Jenkins and William Uricchio, the co-directors of CMS. The proposal reasoned that it would be impractical for Singapore’s game developers to compete head-to-head against market leaders in the production of mainstream games. Growing Singapore’s game industry would require a different approach, one that took advantage of Singapore’s educational, cultural, and technological strengths.

The Media Development Authority of Singapore (MDA) expressed interest, working with CMS to expand the document into a detailed five-year plan. By the middle of 2006, the IDM Steering Committee of the NRF approved the funding of the Singapore and MIT components of the game lab. However, the success of the lab would clearly hinge on its relevance to the Singaporean game industry and to the rest of the world. Public money was about to be spent on academic research instead of direct industry subsidies. To prove its value to Singapore, the lab could not just write about game theory or suggest abstract recommendations. GAMBIT would have to provide concrete examples of innovation that will help make Singapore successful in an international market. As Jenkins explained, “The next generation of game designers will need to be able to communicate in a global context and appreciate the cultural diversity that characterizes current game production” (Kohler).

Lost in Translation: Video Game Theory and Practice

As GAMBIT forges its links between East and West, it also seeks to bridge the gulf between video game theory and practice. Despite the growth of game studies as an emerging academic field of research, commercial game companies have generally remained disinterested in what academics have to say about the medium. In a widely circulated editorial, Microsoft researcher John Hopson posited several explanations for this disconnect, providing recommendations for academics who wished to get their ideas through to game makers. His most forcefully expressed point was the imperative: Prove it. He challenged researchers to come down from the ivory tower and demonstrate the value of their theories through the building of actual games. In a similar response to Janet Murray, Mark Barrett describes his frustration, “I need to know how to make things,
and that means I need practical solutions and reliable techniques to draw from.

Some academics responded to subsequent talks on the same topic by pointing to the high barrier of entry for academic researchers. Commercial video games can have production budgets of millions of dollars and require years of work by large, highly skilled professional teams of developers. Most educational institutions are not on the same playing field with such multinational media corporations. Hopson stated that academics had to implement their ideas to gain the attention of the game industry; academics argued that they lacked communication and credibility with the very practitioners whom they needed to implement new ideas (Hopson).

Furthermore, if academia limited all research to that which could be implemented and tested in a commercial project, it would throttle the richness of game scholarship. The giant development budgets in the game industry enable the creation of massive virtual worlds and astonishing visual effects but the studio mode of production currently dominating the game industry requires sure-fire blockbusters within genres already recognized and valued by the hardcore consumers. Helen Kennedy comments, “[Academic researchers] contribute a great deal to the potential meanings, issues, and frameworks which might be applied to the medium . . . thus opening up a field which might appear quite closed, autonomous, and potentially rather self-determining.” In short, academic research was valuable because it was not commercially driven, because it could point towards and could explore roads not taken by the mainstream industry, thus holding open alternatives for the future of the emerging medium.

Both perspectives reflected the realities of academic and industrial environments. However, both perspectives also grew from an earnest desire to explore the breadth and depth of the medium of video games. At best, game companies want academia to blaze a trail that they can follow, allowing them to colonize, populate, and profit from new possibilities. Chris Crawford describes the worst case scenario: “the academics are rushing to study games, and the industry doesn’t much care.” If academics wish for their research findings to influence the industry, researchers need to acknowledge and work within the limitations of the practice. They need to make games.

However, academics can be strategic about how they approach their goals. Instead of relying on professional developers to demonstrate their ideas, they can take advantage of the industry’s own inventions to make very different types of games. In 2007, new inexpensive commercial technologies and prototyping practices became widely accessible to the independent, low-cost game developer. New platforms and online distribution methods allowed small games with great ideas to reach new
audiences. This presents academic and independent video game developers with a similar opportunity to that exploited by the first generation of independent film makers, many of whom had emerged from film production programs in universities. Rather than beat Hollywood at its own game, they identified and filled gaps in the marketplace ignored by the bloated studio films.  

Key to GAMBIT’s ongoing success would be its ability to articulate academic research questions and execute modestly budgeted game development projects, strategically positioned to avoid having the smaller games directly compete against industry products. However, as with all educational initiatives, GAMBIT has another avenue to influence the industry: the MIT and Singapore students, who will become the game designers, programmers, and artists of the future. GAMBIT research fuels the development of video-game-related classes within the MIT curriculum, enabling new partnerships between the Comparative Media Studies Program and the Computer Science Department. Based on the framework developed by the Education Special Interest Group of the International Game Developers Association, every research question and development project sponsored by GAMBIT needs the support of curriculum and coursework necessary for students to develop their own understanding of games. Even though the long-term effect may only be felt after students graduate and enter the industry, education, development, and research may still enable effective dialogue between academia and industry.

Attempting to bridge the gap between industry and academia is no particular accomplishment in itself; it is a common approach in other disciplines such as engineering. However, the video game industry itself is young: it is constantly adapting to new business models and production schemes. Furthermore, video game scholarship is still in the process of defining itself as an academic discipline, formulating its relationship to other areas of study. Any bridge built between industry and academia would likely be a little unstable for the near future. However, GAMBIT is not facing this challenge alone. To name some other efforts, the Game Innovation Lab at USC, the Entertainment Technology Center at Carnegie Mellon, and the Digital Media Program at the Georgia Institute of Technology, all have similar gaming research projects.

GAMBIT’s goal of establishing relationships at an international level adds a unique layer of complexity to the whole project. To illustrate this complicated process and the benefits and drawbacks of GAMBIT’s early execution, an instructive example would be the story of AudiOdyssey, one of the games developed during the first year of GAMBIT. AudiOdyssey represents an early attempt by the project to create these bridges—between theory and practice, between education and industry, and between
Singapore and the USA. Analyzing the production of the prototype game sheds light on how industrial methods influenced the academic paradigm and vice-versa. In embracing change, unexpected success went hand in hand with informative failures.

**Defining Hard Questions: Audio Games Research**

Experiments test hypotheses: the results of well-designed experiments will shed light on their hypotheses, and both failure and success can be equally illuminating. Thus, the choice of the hypothesis often has greater bearing on the relevance of the experiment than the outcome. Even with a successful experiment, a poorly chosen hypothesis will fail to address the concerns of practitioners in the field. In the game industry, many practitioners already conflate experimentation with “blue sky” speculation, the exploration of game design possibilities unencumbered by the technological and market constraints of the real world.

To build the bridge between research and practice, GAMBIT needed to adopt an attitude of innovation to guide its experimentation. Innovators speak the language of the industry and desire to improve the experiences of the end-user through the creation of products. Innovators build on what has come before, acknowledge the real world challenges, and help move industry forward in iterative cycles. Innovators aim to stay for the long haul, allowing the reality of practice and the results of experiments to inform their exploration and the future development of the medium.

At GAMBIT, innovation begins with the selection of the right research question, trying to find the “sweet spot” where an academic endeavor can have the most impact. For its first year of operation, GAMBIT culled game research concepts over a semester, engaging CMS students and faculty in a process of conversation, investigation, background research, collaboration with other academic departments, and finally, the submission of written proposals. As required by the terms of collaboration, the lab would only support proposals that attracted mutual interest from faculty at MIT and the consortium of Singaporean institutions. However, the final selection criteria proved to be the most stringent: which proposals would be viable within the harsh timeline of three-month development cycles? How could GAMBIT translate the research questions into quickly and inexpensively produced games, using gameplay to communicate the ideas to the industry, receiving feedback from practitioners and players, and allowing those results to inform multiple iterations?

During a brainstorming session with several CMS-affiliated researchers in the beginning of 2007, GAMBIT collaborators from MIT noted the challenges facing the Singapore game industry, identifying the risks
involved in building console and PC games given the competitive advantage enjoyed by the well-established game industries in the USA, Japan, China, and Korea. However, Singapore’s wireless infrastructure and good relationships with regional markets gave it an edge in the development of games for mobile phones, particularly games with multiplayer capabilities. Since mobile phones had technological limitations in terms of computational capability and graphical power—good mobile games distinguished themselves with simple gameplay and elegant design instead of photo-realistic 3D graphics—the mobile platform presented a level playing field for market newcomers, independent game designers, and academic research projects.

Further examination of the capabilities of mobile phones noted that they generally had more sophisticated audio features than visual processing power due to their telephone ancestry. Games that stressed sonic artistry over visual detail presented a further opportunity for Singapore to side step the graphical arms race and to access a different audience. Music and rhythm games like Guitar Hero (Harmonix Music Systems, Inc., 2005) and Dance Dance Revolution (Konami Corporation, 1998) were already proving to be popular products among mainstream gamers despite their modest visuals. Conventional industry wisdom assumed that music games represented a niche genre; fans of Guitar Hero and its sequels proved otherwise. Yet, the mainstream game industry was not actively exploring other potential forms of audio entertainment, such as radio drama and comedy. Even within existing audio game genres, few designers had fully explored the expressive capacities of the soundtrack.

There was a second motivation for exploring audio game entertainment. The global game industry had noted Nintendo’s great success in expanding the market beyond the “hardcore gamer” demographic. Confronting declining games sales in Japan, Nintendo and its competitors had spent significant time and money on games designed to appeal to women and the elderly. Casual games, simpler control schemes, and inclusive marketing were all becoming increasingly visible in mainstream publications such as Time and Newsweek. However, blind users were not included in this expanded games market. Game industry research over the preceding decade had focused heavily on improving visual sophistication, such as high-definition displays and 3-D acceleration, or on designing new interfaces that were reliant on visual feedback, such as touch screens and wireless pointing devices. The global game industry had showed little interest in courting visually impaired players.

A huge percentage of Americans (18.6 percent of Americans aged 16–64, according to the 2000 US census) have some form of disability, ranging from mental, motor, or sensory challenges. Small but vocal
groups of disabled gamers have been clamoring for accessible games and accessible controllers on websites such as AudioGames.net, eagerly sharing detailed reviews of the few examples that exist. Few of these games were engaging to both sighted and impaired players. Some games designed to be accessible to the blind became inaccessible to sighted players.

For example, the primary challenge in first-person shooter games is to shoot an opponent before being shot, often combined with the challenges of navigating a complex environment of cover and traps. The audio-only alternatives were largely limited to basic movement and navigation, where finding and successfully walking through a door based on stereo cues would be a great achievement. Such games do not match the level of challenge presented by similar games designed for sighted gamers. As another example, a generic racing game would have players driving rapidly through twisting courses and exotic locales to edge out the competition. Blind-accessible versions simply offered a variation on “Simon Says,” with the player dodging objects rendered as stereo sounds, receiving little feedback about their vehicle’s speed or their surrounding environment.

Most creators of blind-accessible games were independent developers and hobbyists working with limited budgets, yet even so, these few titles were in high among a group of consumers that had embraced high technology, such as Shades of Doom by GMA Games, who wished to participate in experiences taken for granted by their sighted counterparts. The professional industry generally ignored the potentially large market, underestimating and under-serving the growing population of visually impaired gamers.

Through this process of identifying the strengths of Singapore developers (mobile phones), examining how those strengths could be extended (audio games), and describing the market opportunities to be explored (accessible games for the blind), GAMBIT constructed a research proposal that was firmly grounded in reality and could help to expand the understanding of games as a medium. Singaporean researchers were eager to collaborate on an “Audio Games” project. Game developers visiting GAMBIT quickly understood the potentials and challenges that such a project represented. Such a project might be too “risky” for most companies to undertake; yet practitioners indicated that they would be interested in seeing the results, particularly in the form of a playable game.

Exploratory interviews with the blind community in Boston and other developers for blind-accessible games identified unexplored opportunities that enabled the team to refine guidelines, serving as a basis for a prototype. Such a game needed to allow visually impaired and sighted users to share a common gaming experience. The game had to be accessible to both sighted and visually impaired users, regardless of the severity of their
impairment. An online multiplayer component would allow the sighted and blind to play together without being aware of the visual status of their fellow gamers. The game would aim to make alternative spatial control schemes accessible to blind gamers. On top of all that, the game needed to be fun, challenging, and engaging, relying more on audio than visuals to produce an exciting experience.17

**Adopting Industry Practices: Agile Game Development**

For the Summer of 2007, GAMBIT selected over 30 students from Singapore based on the strength of their academic records, portfolios, and their demonstrated passion for video games to travel to Cambridge, Massachusetts for a nine-week internship, working with MIT graduates and undergraduates to develop six new games. The summer program was an experiment in itself. GAMBIT staff sought to address Hopson’s challenge and Mortenson’s worries: How could an academic project create polished video games within an environment of extreme limitations of time and development expertise? Academic theorists and researchers had very few examples of finishing and releasing complete games. Released games from academia historically lacked in documentation, stability, and usability. The short development cycle and sheer variety of projects in GAMBIT put organization and management of teams at the highest priority. GAMBIT needed a process that facilitated polish and testing for student-developed games, one that drew a high level of commitment from students without burning them out before the end of the summer. Top-down supervision of the six summer teams was out of the question; each team needed to be relatively self-sufficient and able to respond to their projects’ unique challenges with extreme flexibility and competent crisis management.

GAMBIT chose not to solve this problem in a vacuum. Instead, by researching evolving management practices among practitioners, GAMBIT identified the “Scrum” project management model as an increasingly popular industrial solution for similar problems in commercial software development.18 The model presented a strategy for scoping and executing projects that required agile product development on complex tasks that required teams to act on new findings, unexpected outcomes, and user feedback. It seemed ideal for game prototyping and game developers across the world were beginning to take note.19 GAMBIT thus embraced the “Scrum” model to structure its first summer of game development.

The GAMBIT summer teams were small by game industry standards. Each team had seven members: two programmers, two artists, a game designer, a test lead, and a project manager. In addition, a two-person sound and music team provided services to all of the development teams.
After a week of brainstorming and lectures, the teams subsequently adhered to an iterative cycle, dividing work into four fortnightly sprints and demonstrating a playable build of their games every two weeks. This allowed teams to periodically gather user feedback and honestly examine their progress.

Each team worked with one or two researchers to design and build a game to demonstrate a single research idea. The team and researcher would collaborate to produce a list of design and technical features. The researcher would prioritize the list according to the relevance of each feature to the research question. The team would select a few top-priority features to implement over the following two weeks, breaking them down into individual tasks and development strategies. After each fortnight, the team would demonstrate new functionality in a single software build to the researcher. Such an approach pushed team members not just to produce assets (code, concept art, music, design documents) but to also integrate these features into a working prototype every other week.

Before embarking on another sprint, the team and researcher would discuss which methods and strategies worked best and which failed to serve their specific needs. Like their commercial counterparts, teams needed to strategically scale back projects that were too ambitious to meet the deadlines printed on their return airline tickets. Rather than releasing unfinished games with a lot of “potential,” this process allowed students to focus on the most feasible and engaging ideas. As a fully funded educational research project, GAMBIT students and researchers would share their games without charge. Unlike commercial games that are regularly compared against their competition feature by feature, free games are generally just reviewed on their implemented functionality. Thus, the students had the space to polish their existing features to perfection instead of worrying about the ones that are missing.

Part of the GAMBIT experiment in project management included the minimization of “crunch time,” when developers are subjected to weeks or months of perpetual overtime. Crunch time is a source of great discontent among professional game developers. Conventional industrial wisdom considers it unavoidable. Crunch time causes premature burnout in employees, decreases their average quality of life and work, and tends to drive experienced practitioners from the game industry into other fields. Crunch conditions may also reinforce the homogeneity of game development workplaces, driving out all but the young “rock star” developers who have few aspirations outside of their professional lives. GAMBIT staff consistently discouraged overtime to engender a healthy workplace environment and test a model of sustainable development. Teams were required to freeze all new feature development in the last two
weeks, reserving the last sprint for polishing or cutting existing features. In this manner, GAMBIT staff emphasized the importance of competent project management, in the hopes of demonstrating that it would be possible to complete a game development project with minimal crunch.

The creative ability of each team to design gameplay and solve problems was crucial for fulfilling the research goals of each researcher. For many students, this was their first experience in a comprehensive production environment. Alongside the efforts to turn theory into practice, GAMBIT also aimed to enhance the education of practitioner-theorists. The summer program periodically featured lectures about game design, usability, animation, and technical issues. Local Boston game industry professionals visited the students to share insider perspectives on design challenges and commercial work. These sessions aimed to expand the intellectual and professional horizons of the students while helping the game development teams refine their designs and techniques.

An academic environment should be more tolerant of mistakes than in industry; GAMBIT assumed that teams would make many mistakes as they ventured into unexplored territories of game research. At the same time, the academy must provide the scaffolding for students and researchers to learn from their mistakes, and this challenge is not unique to education. In practice, while a game designer may envision a beautifully complex game, the expertise, time, and resources of the development team limits its ability to fulfill that vision. Many commercial projects are stillborn because of the inability of team leaders and members to reach compromises that reflect the realities of their production context and to adapt to new information once a plan is set into motion.

From Challenge to Reality: AudiOdyssey

The progress of the Audio Games project from research through development illustrates our process of translating theory into practice. Ambitious experimental hypotheses quickly gave way to reality. The original concept of the project straddled mobile platforms, audio-based gameplay, novel control schemes, and accessibility for blind gamers. Despite the considerable audio capabilities of mobile phones, however, the limited system memory of such devices in 2007 made them unsuitable for storing and playing back multiple sound channels. GAMBIT staff decided to dedicate a separate student team to exploring online gameplay on mobile phones with Backflow. This freed the Audio Games team from the constraints of mobile platforms to develop AudiOdyssey, a music rhythm game that runs on Windows PCs.

The player takes on the role of a club DJ. Each level in the game is a
different song. The player matches sounds in the music with the arrow keys on the keyboard or by moving a motion-sensitive controller for the Nintendo Wii. Successful matches with the music adds layers of instruments, rewarding the player with a richer musical composition, the cheers of an appreciative dance crowd, and a new rhythmic challenge to meet. Completing all the challenges results in a “freestyle” mode, where the player can improvise without constraints. Inevitably, the overexcited crowd accidentally bumps the DJ’s turntables, requiring the player to build up tracks for the next freestyle.

The two-person sound team delivered high quality music that the AudiOdyssey team worked hard to integrate. Testing proved the game to be fun for both sighted and blind players, satisfying the primary goal for the project. However, an online multiplayer component proved too difficult and time-consuming to implement. Furthermore, while the motion-sensitive Wii controller provided a new experience for blind gamers, the minimal familiarity with the Nintendo Wii also meant that blind testers needed coaching in the use of the motion controller. The keyboard controls were generally easier for all players to understand.

Scrum aimed to reduce crunch time by basing project management decisions on realistic expectations. However, by giving the students
ownership over the game design, the increased commitment still resulted in students putting in more hours than were required. Motivated students found it difficult to sacrifice ideas for the sake of personal health, and many only discovered the need for polish time at the end of the project. For instance, once the AudiOdyssey team completed a fully functional game with an automated installer, a functioning menu system, and well-implemented gameplay, the team decided to add a new song to the game at the last minute. Despite having made a working game that met all of the GAMBIT standards of quality, they chose to end their development cycle with an extremely difficult level that was practically impossible to play. Recovering the earlier version for public release required an unnecessary amount of unanticipated work by members of the team.

Although the resulting game did not address every design challenge, the careful selection of the core hypotheses allowed failures to provide valuable information about the limits and possibilities of future audio games. The realities of production and the risks of venturing into new design territory informed the translation of theoretical concepts into a complete game. The academic participants better understood the challenges of creating something truly new and the need to balance novelty against the prior expectations and experiences of the audience. What design paradigms would offer similar experiences to sighted and blind players? What control schemes do blind players prefer? How would menus work? Instead of theory and speculation, GAMBIT responded to the challenge by providing concrete examples that the industry could easily understand and adopt.

AudiOdyssey became an effective research tool and an artifact for communicating new ideas in accessible gameplay. As a playable game, AudiOdyssey increased the visibility of the core research in both the industry and the press. Demonstrated at the Games Convention Asia 2007 in Singapore, industry professionals were able to pick up a controller and interact with a research concept that, three months earlier, only existed in academic writing. Though imperfect, AudiOdyssey provided the team of students and the researchers with valuable educational insight, and the game successfully represents the unique constraints of the research question and the personalities of its development team.

Learning from Students: From Narbacular Drop to Portal

GAMBIT’s student designers benefited greatly from adopting industry methods and confronting high professional standards. It demonstrated that academics could translate their research into a form called for by industry leaders. However, how will the industry respond? Will game companies in Singapore and around the world be willing to adopt fresh ideas
from students in their pursuit of mainstream audiences? The advantages of industry acceptance could be huge: professional game companies could observe new kinds of play, expand on them with better production values, deploy them with stable and sophisticated internal tools and engines, and leverage existing distribution networks to bring them to market.

This is precisely what happened in 2007 with the game *Portal* (Valve Corporation, 2007). In 2005, students from the DigiPen Institute of Technology released a game named *Narbacular Drop*, developed as a school project. The player must navigate a series of environmental puzzles by manipulating a portal between two exits in space. To get the character to a high ledge, one could place a portal exit above the ledge and another on a wall close to the character. The player then directs the character to walk through the portal to the previously inaccessible location. The effect is thrilling and uncanny, representing a brand new way of moving through a game space. The above description does the game little justice—one needs to see the game in action to understand its twisted physics, and one needs to play the game to understand its appeal.

Even though *Narbacular Drop* suffers from coarse graphics, buggy gameplay, and unexceptional sound effects, the core innovation shines through in a functional game that made the rounds at conferences.

![Figure 13.2 Narbacular Drop. (Copyright 2005, Nuclear Monkey Software.)](image-url)
won awards at independent game festivals, and found its audience through free online distribution. It quickly caught the attention of Valve Corporation, the developer of the popular *Half-Life* (Valve L.L.C, 1998) series of first-person shooters. The students demonstrated the game to company executives, who hired them on the spot to work on a new game, *Portal*, combining the concept of *Narbacular Drop* with Valve’s advanced 3-D technologies and substantial professional resources.²³

In high-profile games such as *Grand Theft Auto III* (DMA Design Limited, 2001) and *Jak and Daxter* (Naughty Dog, Inc., 2001), the industry has shown a tendency to take a kitchen sink approach to game design, stuffing as many features and mechanics into as large a virtual world as possible. While the game industry is largely supported by profits derived from sequels of popular game series, this process begins by the creation of hit games based on new intellectual property. Most games meet with commercial failure and smaller innovative games suggest smaller amounts of financial risk.

If for no other reason other than necessity, academic and independent game developers are comfortable with identifying and honing a single concept to perfection. With both *Portal* and *Narbacular Drop*, the designers started with a core innovation and built their entire game around it. Game producer Kim Swift notes that an established studio risks tarnishing their reputation if they release an insufficiently polished product. In contrast, the expectations for an independent or student game are low, allowing
players to forgive the rough edges and focus on the ideas.\footnote{24} With online
distribution, independent video game companies and research projects
such as GAMBIT can affordably produce and share playable prototypes
that explore new creative territory, knowing that word-of-mouth advertis-
ing will allow the most interesting concepts to find their audiences.

So far, no game developed by GAMBIT has yet achieved the visibility of
\textit{Narbacular Drop}. As we write, the program is less than one year old. We
will learn through successive years of experimentation and innovation. In
the meantime, \textit{AudiOdyssey} unearths strategies for designing satisfying
game experiences that can be shared by blind gamers and their sighted
friends. With this approach, GAMBIT will continue to explore issues and
possibilities that exist just off the industry’s radar screen.

\textbf{Post-mortem}

The first summer of game development laid the ground for the iterative
development process at the Singapore-MIT GAMBIT Game Laboratory. In
adopting industry practices, GAMBIT also adopted the convention of the
professional “post-mortem.” When a developer finishes a new title, the
team meets with others in the business to discuss what they learned from
the process, highlighting both their successes and their failures. Each of the
GAMBIT teams prepared post-mortem presentations, listing the five
things they did right and the five things that could have been improved.
Like the student teams, the GAMBIT staff also prepared a post-mortem
to identify process improvements. Some mistakes were technological,
such as a poor software setup for student laptops. Others were method-
ological: the formation of the teams was rushed and resulted in some poor
matches between student abilities and project requirements. More time
was also needed for early brainstorming. The role of the test lead needed
more definition. However, despite the hiccups in the process, most teams
succeeded in designing and implementing a playable game around an
innovative core idea.

In the post-mortem, the GAMBIT staff applied the same transparency,
reflexivity, and adaptability that was required from the students to the
operations of the lab itself, extending the same welcoming embrace of
change that resulted in the successful development of the game prototypes.
In this manner, the Singapore-MIT GAMBIT Game Laboratory will con-
continue to respond to changing circumstances and new challenges to build
bridges between academic research and industry practice, negotiate di-
fferent priorities and cultures, and contribute to the global growth of the
medium of games.
Notes
