From Jeopardy® to Americas Army® - Linking Serious Games to Performance Objectives

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Abstract

The topic of serious games continues to drive lively debate, experimentation, and discovery by learners, trainers, and sponsors alike. New models are emerging, hand in hand with facilitating technology. Concepts like "Gamification" and "Games-Based Learning" are further expanding the definition. This on-going evolution makes it more important than ever to have a method for identifying opportunities, and in turn, designing serious games that have a measurable impact on performance.

This paper will examine the approach used to design and develop a serious game portal for the U.S. Army that received more than 18,000 game plays within the first two weeks of launch. We have worked with and continue to learn from thought leaders in this space including Clark Aldrich, Jesse Schell, Talib Hussain, Curtiss Murphy, and Ruth Clark. The findings in this paper represent our on-going journey towards developing engaging learning solutions. The examples and language used in this paper are oriented to the Federal Government, but the underlying concepts are not unique to the public space. To orient the topic, we will need a framework for defining and categorizing serious games along with some context on why they are important for learning and development.

Keywords

Serious games, game mechanics, learning theory, process

Why Use Serious Games?

It hasn't been until recently that the term "serious game" has been an accepted term within many federal agencies and industry. "Serious organizations don't play games", was an oft heard refrain. That said, serious games have been around for a long time, and there have been important initiatives within the Federal Government throughout the past decade, both big and small. America's Army® is one of the most visible examples of a government sponsored serious game that has gone mainstream.

So what's so special about serious games now? The adage about the chicken that miraculously hatches an egg one day comes to mind. Stunned bystanders applaud at this seeming miracle, completely unaware of the fact that the chicken has been caring for and incubating that egg for the past 3 weeks. Serious games are coming of age due to a confluence of factors including demographics, technology,

and culture. The combination of these forces has and continues to serve as an incubator for serious games.

The following three points are examples of these forces and their impact on the perception of serious games as a prescient learning modality:

1. Digital natives are increasingly filling the ranks of government and industry. Young people have been brought up in a highly connected social mix facilitated with technology that is adaptive based on the way users interact. There is an expectation that systems are interactive, and responsive to individual needs. Static eLearning that fails to engage learners with relevant-to-the-job challenges has never worked for any age, and it has never been truer now with digital natives.

2. Gaming has become socially main stream. According to Sharon Waxman[1] editor of [The Wrap](#), the number one movie going demographic is watching fewer movies and playing more games. Smart phones too have ushered in a new era of casual game play and introduced whole new audiences to gaming. According to the Entertainment Software Association[2] the median age of gamers has increased to 37 and the percentage of female gamers has grown to 42%. Additionally, 29% of Americans over the age of 50 play video games.

3. There is a backlash against ineffective eLearning that has all too often become the standard for organizational distance learning. It is a mistake to call eLearning categorically bad. There are good examples that use effective instructional strategies and media and become an important part of a broader learning and development program. With that said, eLearning is a mature market that has become increasingly commoditized. Certain models have emerged as a standard for low cost, quick turn-around training that frustrates users and has little impact on organizational goals.

Game Theory and Learning Theory

There has been a lot of research that compares aspects of game theory with learning theory[3]. The case is being made that while the two activities are focused on separate outcomes, i.e. entertainment vs. learning, they are not exclusive. Furthermore, factors that lead to good game play are also factors that lead to optimal learning. While the language used to describe these factors is unique to the gaming or learning domain, the end result is similar. Ruth Clark[4] outlined a set of cognitive processes involved in learning which are based on a cognitive learning model[5]:

- Attention: selecting the important information on screen
- Optimized Mental Load: managing capacity of working memory
- Active Processing: combining information in working memory with existing knowledge in long term memory by way of rehearsal
- Retrieval: accessing new knowledge from long term memory when needed
- Management of processes by way of metacognitive skills

Games have certain qualities that compliment many of these processes. Serious games can be used as a means for motivating learners through the use of competition, (either with oneself or others); calibrating cognitive load through the use of levels and the principals of Flow[5]; active processing through practice and rehearsal; using story and context to anchor content to future situations in which the skills or behaviors will be required; and using game mechanics to help manage the learning process including goals, and feedback.

Learning	Games
Attention	Challenge
Optimized Mental Load	Levels, and Flow
Active Processing	Practice and Rehearsal
Retrieval	Story, context
Management of processes	Game goals, and feedback loops

A Word on Flow

Flow is a term that is used frequently when talking about game play and game design. Mihály Csíkszentmihályi coined the term in his 1990 book by the same name. In short, Flow is a mental state in which a person is fully immersed in the activity that they are doing. Flow involves a keen focus on attaining goals that are challenging but possible, and that provide the right degree of feedback and difficulty to fully engage the person.

The following conditions are required to achieve a state of flow:

1. Clear goals
2. Immediate feedback
3. The task must be challenging but doable for the individual

Defining Serious Games

It has been argued that all games require the player to learn something. At very least they have to learn how to play the game. So what sets a serious game apart? This is a working definition that allows for multiple game genres, while requiring that there exist a focus on a learning process outcome as opposed to a primary focus on entertainment.

Serious Game: a game that is designed, first and foremost, to support the learning process including reinforcement, skill and behavior development, and assessment.

This is good enough to get us started, however, because there are multiple genres and sub-genres of games, along with multiple game mechanics, (see appendix for a list of 27 compiled through the gamification.org wiki), it can be difficult to see the forest from the trees. A survey of games that have been developed for the organizations will reveal multiple genres using a variety of mechanics, graphic levels, and requiring vastly different resources, and schedules to produce.

For examples, compare some of the games developed by [Raptivity](#), (Intended to be used within existing eLearning courses); with these games developed for the [Defense Acquisition University](#). And then download and play [America's Army](#). It is easy to see how important it is to have a way of classifying serious games in order to carry on any discussion related to effectiveness, development effort, or best practices.

To facilitate this we have come up with two sets of criteria:

Instructional objectives

1. Games used for reinforcement and practice
2. Games used for learning
3. Games used for assessment

Format

1. Courseware-embedded
2. Standalone shorts
3. Long form, task-oriented
4. Immersive virtual worlds

Understanding the high level instructional objective gives some guidance in the way that we mix and implement game mechanics. For example, using a drill and practice mechanic such as concentration, or Jeopardy for a game that is intended to teach new skills or behaviors will fall short.

Determining the format requires that we take budget, and schedule into consideration from the outset, and consider the game content relative to the instructional requirements.

The result of this initial classification helps define what the game is not, and gives us a position from which to consider game mechanics that are appropriate. Here is a description of each of these areas:

Instructional Objectives

Games for Reinforcement and Practice

Games in this category are often simple memory games that encourage replay using some kind of scoring system. Classic examples include Concentration, and Jeopardy, along with variations that emphasize factual recall along with a game mechanic that requires learners to answer questions for points or progress, match objects on a board, or solve a puzzle. Because the interaction is intended to be relatively short and focuses on content that has already been learned, the use of "story", is downplayed if not entirely absent; with the emphasis on the challenge aspect of the game. These types of games often come under fire for not being "serious" enough for a serious game. I argue that because these interactions leverage game mechanics as an instructional tool that they belong in the broad category of serious games, and that they underscore the importance of classifying types of games according to the desired outcomes. Games in this category align with the knowledge level in Bloom's taxonomy.

Games for Learning

Games intended to teach someone something are typically more complex than games used for reinforcement and practice. Story becomes an important factor because it provides context for a variety of decisions and actions to take place. Games that are intended to teach somebody something will often rely on scenarios that present decision points for the leaner along with consequences. The very act of making decisions, having an opportunity to make the wrong decision, and receiving feedback facilitates learning. Games in this category are designed with a certain amount of learning content "scaffolding" to provide learners with the information they need to make decisions. Typically feedback is provided throughout the course of play and learners are encouraged to experiment within the environment.

Games for Assessment

Games used to test a person's mastery of content can be similar to games for learning with regard to the use of story, and setting up scenarios that have multiple decision points. The biggest difference is in the nature of the feedback. With games designed to teach, the act of trying out different options to see what happens is where the learning takes place. In the case of assessment, it is assumed that the learner already knows the material, and therefore the focus is on demonstrating that knowledge. Assessment games might have learners perform a set of tasks without any remediation during the interactions, relying on a final performance review after the tasks have been completed.

Format

Courseware-embedded

Embedding games within online courses provides a means of evaluating student progress and comprehension while also increasing the student's level of engagement. Embedded games range from classic well-known games like Jeopardy, to more animated games like Battleship, to sophisticated customized 3D worlds that allow users to navigate through a scene and investigate objects within the scene. Courseware-embedded games tend to be relatively short and focused on assessing the student's understanding of concepts that have been presented within the course.

Standalone Shorts

Some subject material needs to be reviewed frequently in order to remind people about specific policies and procedures they need to follow in their day-to-day work. This is especially true in the areas of workplace safety and asset security. It's not always good enough to have employees review this type of information once or twice a year. Employers need to keep this information in front of employees on a regular basis, and they need to do it in a way that doesn't become tiring and uninteresting.

Standalone shorts can include some basic introductory information and an online board game, word puzzle, or other casual game that can be played by employees a few minutes at a time. Employees can return to the games (and educational content) as often as they wish, but each session only requires a brief commitment so even busy employees can get the benefit of the game without requiring a large time commitment.

Task-oriented Games

Sometimes, the best way to teach a topic is to use a game setting as the main delivery channel. In these cases, the student needs to learn the subject matter through an experimental process in order to learn the cause and effect relationships between entities in an environment. These games are generally

focused on a specific set of tasks to ensure that the student has meaningful successes and failures. Examples of this type of game include process simulations, component configuration games, and policy implementation verification games. Students are allowed to select certain criteria to meet a specific mission's requirements, and the game evaluates those decisions to determine how well the student understands the underlying concepts.

Since the game is the main presentation tool for the learning content, significant educational scaffolding must be included within the game structure to ensure that the student can easily find supporting material for new concepts and adequate remedial information to reference when the game indicates the student has failed to meet the mission's requirements.

Immersive Virtual Worlds

For more complex games where players are provided with a set of basic rules and then allowed to construct their own world to meet the game's requirements, a fully interactive 3D immersive world can be created. Within such a virtual world, players can move around the world and manipulate objects to construct complex systems or interact with other characters to achieve desired goals. This type of game provides a fairly free-form environment where the player can apply independent knowledge in an unstructured way to demonstrate his or her level of proficiency with the subject matter.

Virtual worlds may operate in either stand-alone mode with a single user or in multiplayer mode where several players on different computers share the same virtual world.

Games that use virtual worlds are normally intended for use by more advanced users and therefore may not include large amounts of supporting educational material. However, some virtual world games make no assumptions about the skills and competencies of the players, so those games should contain more educational scaffolding to ensure that novice players can find the information they need to be successful in the game.

Introducing Safety City

We developed a gaming portal for the U.S. Army as a part of a comprehensive safety campaign for service members and their families. This was a significant departure from the poster and email campaigns that were typical of this type of initiative. One of the most significant challenges with this approach was to design and develop games that were not only fun to play, but also promoted safe behavior. In addition to accessing the games, the portal served as a resource for safety content in the form of videos, and other media. We built social components into the games to promote commenting, challenging other players and rating of the games.

We developed ten games and released them in three separate launches. With each of the three sets of games we progressively strived to maximize the playability and fun, while making the safety content increasingly more integral to the game.

Water Safety

The first series consisted of four games focused on water safety. These games relied on familiar arcade style game mechanics, and used an integrated messaging platform to serve up safety trivia and factoids to players as they leveled up. These initial games proved to be popular with players resulting in over 18,000 combined game plays within the first two weeks of launch.

Swim to the other side of the lake and avoid the hazards, modeled off of the popular arcade game Frogger.

The launch was considered to be a big success based on the number of safety impressions, far outnumbering those of any previous campaign.

We introduced a concept with the water safety games that we call "Games-based Messaging". The games themselves were intended to be "magnets" to attract the audience and then expose them to safety messages throughout the course of the game play. The games themselves emphasized playability over content authenticity, relying on the messaging feature to deliver the "serious" part of a serious game.

Takeaways

The water safety games were successful in terms of providing the fun factor and attracting a lot of plays. We used previously successful mechanics, kept the rules simple, and calibrated levels to support principles of Flow.

Because the messaging functionality and the messages themselves were largely ancillary to the game play, they had less of an impact the longer you played. From the perspective of marketing a safety campaign, and pushing number of safety impressions the audience receives, the games-based messaging approach was quite effective. From the perspective of reorienting often over-looked safety behaviors, this approach is limited.

Firearm Safety Techniques and Pedestrian Safety

The next series of games represent a shift from the water safety series. The messaging component that was used as the primary means of communicating a safety message to the player was still important and in addition to this we wanted to come up with game mechanics that reinforced safe behaviors along with consequences. We shifted the initial high level learning objectives that we had for the water safety games, from general knowledge to behavior change and some skill development. Given the focus on

behaviors and skills, we needed to provide the player with an environment that they could experiment with and receive necessary feedback for learning.

The Transporter requires players to properly handle, break down, and store various fire arms in different situations.

One of the biggest challenges was to blend the engaging aspects of a well-designed game with integrated safety content, essentially requiring players to demonstrate safe behaviors in order to score and progress in the game. Every decision needed to be considered from both the perspective of playability and promoting safety best practices. This is an iterative process and requires some give and take in order to have a successful serious game.

With the three firearm safety games, we emphasized proper handling conditions, and storing and transportation procedures, by using game mechanics that relied on similar behaviors, i.e. proper sequencing, and timing given environmental changes. By closely aligning the mechanics to the desired skills and behaviors, we were able to make the content integral to the game play.

Critical safety violations trigger the "Wheel of Risk" which can result in lost time or "game over"

In the game Pedestrian Dash, we use a combination of mission, points and progress mechanics. Players must accomplish the mission by collecting various items throughout town within a given time limit, while avoiding risky pedestrian safety situations. Players are awarded extra points for things like making eye contact with drivers before crossing streets. In the event that a player performs a critical error like j-walking, the "Wheel of Risk" is spun and can result in "game over" or a time penalty.

Takeaways

We have found that serious games require a combination of instructional design and game design, and there can be a natural creative tension between these two roles. Coming from a training development focus, there can be a tendency to promote the content over the game mechanics and playability, resulting in simple, often incomplete game structures

that do not capitalize on the complimentary nature of game and learning theory. Conversely, failure to develop instructional strategies in harmony with the game mechanics is self-defeating and antithetical to the learning experience.

Serious Games Development Cycle

The process used to develop serious games will be different depending on the nature of the game. As detailed earlier in the paper, games that are drill and practice oriented and intended to be embedded in eLearning courseware, are simpler to implement than a game that is focused on behavior change or skill development, and is expected to be a stand-alone or at least broader in scope.
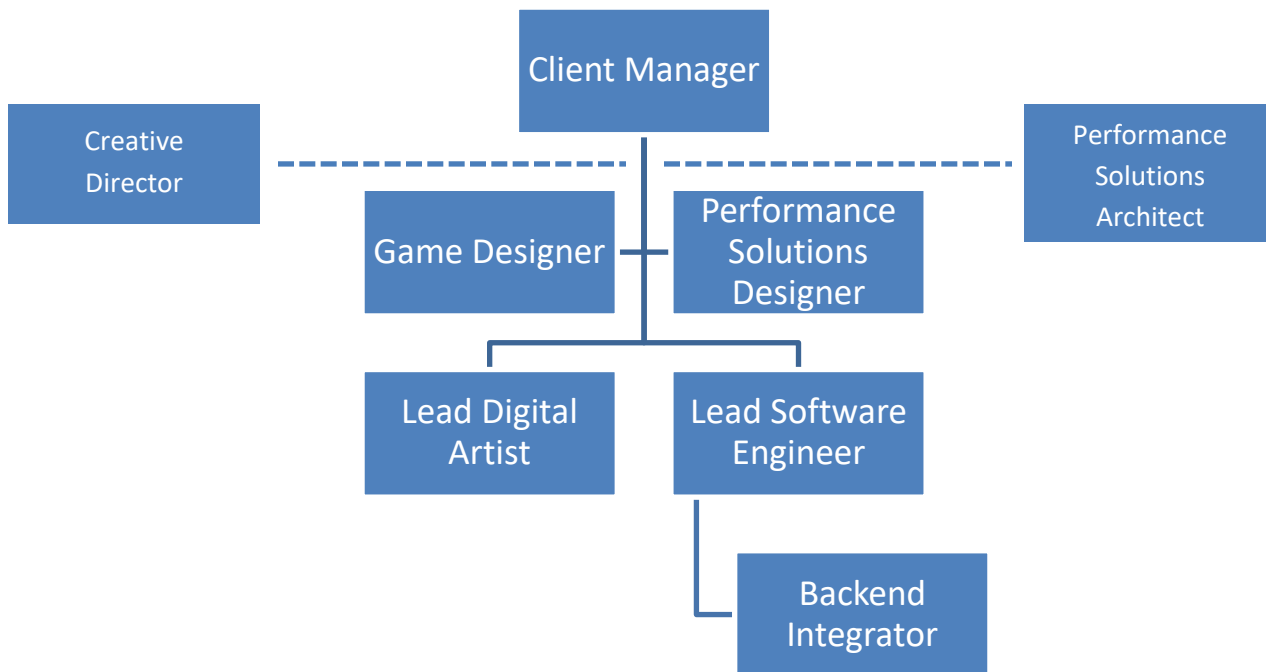
This development cycle has evolved over the course our development on the Army safety games. The nature of these games demanded a different approach from the one that we typically use for eLearning development. Our development process for eLearning is fairly linear, with ISD's developing design documents and storyboards, and then artists creating media assets, along with software engineers developing functionality, and then the entire team moving into a quality control cycle. Typically the nature of the content lends itself to a storyboard format and by the time an artist and software engineer get that content, the vision is 85-95 percent complete. Artists have some input in how they interpret that content, but by and large the vision for what ends up on screen has already been locked in.

One of the biggest differences is the iterative nature of the process. The analogy of stepping stones vs. a paved path is a fitting one. There are certain instructional and game play aspects that coalesce early in the project and these form the stepping stones. Once these are in place, there is an iterative process of filling in the space between those stones which amounts to calibrating playability with pedagogy.

This can be frustrating for instructional designers and others who are used to producing a vision that is complete, by and large, within storyboards and ready to be implemented on screen. Team members need to come into this process expecting a highly collaborative effort that will have creative tension between game design and instructional design, and therein lays the power of serious games.

We have had the opportunity to work closely with thought leaders such as Clark Aldrich, and have been the benefactors of generous knowledge sharing and collaboration. This process borrows much from successful implementations that have gone before, mixed with our own organizational culture and approach.

The Team

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The Client Manager, (CM)

The CM is the advocate for the client, and is the primary liaison. The CM is not typically involved in the actual development of the game, but has the ultimate responsibility of making final decisions, especially in the case of an impasse, based on knowledge of the client. CM's rely on the expertise of the team to provide the optimum solution, in keeping with the budget, schedule and technical parameters of the project. The CM manages the budget, the schedule and facilitates fluid team communication in weekly and sometimes daily team meetings.

The Game Designer, (GD)

The GD and the ISD can be the same person, although they are distinct roles and require different domain knowledge to do effectively. Clark Aldrich has outlined a process in which these roles are embodied in a single Lead Designer. The GD, as a role, is responsible for taking the output of the analysis and instructional design phase including learning objectives, and instructional strategies, and developing a game design that allows learners to practice critical tasks, with appropriate feedback mechanics. The GD is responsible for level design and calibrating difficulty in line with the devised instructional strategies. The GD needs to have a broad knowledge of game mechanics, both theoretically and as a player. Serious games in particular require a GD who is sensitive to cognitive load and developing flow in line with increasingly complex skills and behavior acquisition.

The Instructional Designer, (PSD)

The PSD, also known as an instructional designer or ISD, is responsible for the Needs and task analysis. This analysis serves as the basis for the performance requirement and results in multiple outputs including but not limited to stating the need as a performance problem, defining the audience and any specific requirements, defining success criteria, and identifying the steps needed to perform a set of

tasks satisfactorily. The ISD works closely with the GD to incorporate instructional strategies with the game mechanics and to ensure that the content revealed in the task analysis is covered. Creative tension can arise from the integration of instructional strategies with game mechanics. The GD is focused on developing flow, and the ISD is focused on content inclusion. These do not need to be at odds with each other, and indeed cannot trump one another in order for the game to be successful. The solution needs to be considered from both a pedagogical and game playability perspective, and as we stated earlier in this paper, the way people learn best and the way good games work, are complimentary.

Lead Digital Artist, (Lead DA)

The Lead DA is the primary graphics developer for the project. Depending on the scope, there may be additional artists working with them. For example, some projects may require special graphic assets such as 3D modeling and animation. The Lead DA submits graphics including user interface, and game elements for review by the ISD and GD. The lead DA will work closely with the ISD and GD to make sure that the graphic style is appropriate for the audience and the content, and supports the game play. Balancing cognitive load and usability are key factors when it comes to developing the user interface and game graphics.

Lead Software Engineer, (Lead SE)

The Lead SE is responsible for developing the functionality and logic of the game. The lead SE might work with other specialists depending on the scope of the project, such as game engine experts, and software architects. The Lead SE needs to be brought in early and often on the project to ensure that what is being proposed is in keeping with the business requirements of the project. The Lead SE should be present at all internal deliverable reviews. The Lead SE should maintain the functional requirements of the project, based on the instructional and game design and what has been proposed and approved by the client. The Lead SE is a champion for implementing the functional requirements as designed and should work closely with the GD to devise creative technical solutions for implementing the proposed game mechanics with an emphasis on playability. A Lead SE who is also a gamer is particularly helpful, especially when it comes to implementing functionality to support flow and optimal cognitive load.

Backend Integrator

The backend integrator will work with the Lead SE and others to facilitate data transfer between the game and other systems. Many games will need to be SCORM conformant in order to pass data, such as progress and score, back and forth between learning management systems. Other data might include the gathering of anonymous user metrics, and implementing features such as leader boards, commenting, rating, and sharing.

Creative Director and Performance Solutions Architect

In some organizations there might also be a Creative Director, (CD), and a Performance Architect (PSA), involved in regular reviews of the project. The CD and the PA are senior members of the team, and provide feedback based on technical experience, corporate strategy, and cross project "pollination". The CD and PSA are members of the team, and in the case of conflicting views, the CM will make a call based off all information provided and knowledge of the client and business requirements.

The Process

Following is an overview of a modified ADDIE framework we have used to develop serious games. ADDIE stands for Analysis, Design, Development, Implementation, Evaluation, and is a popular framework for developing adult instruction.

Analysis

1. Identify the problem to be impacted and causes
2. Identify audience characteristics and requirements
3. Identify performance objectives to overcome the problem
4. Set technical expectations with client and team
   - A casual game on your iPhone is significantly different in scope from a massive multiplayer online game
   - High level budget and schedule: These are round about metrics and are based on guidance provided by Clark Aldrich in his publication "Building Sims the Clark Aldrich Way". An Adobe Flash-based game with about 45 minutes of content that uses an established game model will cost around $100K and take 6-9 months to develop. This price can change significantly depending on the number of stakeholders, the complexity of game mechanics, and whether a game engine already exists, just to name a few.
5. Relative prioritization and validation with client

Events

- Review content provided by client – PSA, PSD, CM,CD
- Client call(s) – Research and analysis (learn more, fill in the gaps, get at root causes, behaviors, and desired results) – PSA, PSD, CM, CD
- Internal Analysis discussion meeting – PSA, PSD, CD, CM, GD
- Generate Analysis report – PSA, PSD
- Internal review of report – CD, CM, GD
- Deliver Report to client and review in conference call (with game root causes/behaviors identified but NOT prioritized – they get prioritized as part of the conference call review)
- Finalize the report (game root causes and behaviors are identified and PRIORITIZED) – PSA, PSD with support from GD and CD

Deliverables

Needs Analysis/Data Analysis Report- Should include grouped root causes, detailed targeted behaviors – good and bad, detailed desired results, consequences, penalties, rewards, motivational elements, engagement elements, etc.

Concept Design (High Level)

1. Identify root causes that may be effectively addressed in a game –PSD, GD, CD, PSA
2. Research existing game models and determine if these can be used to meet the performance objectives. - GD, CD
3. Identify the tone. This includes: visual theme, and narrative voice. The tone will be informed by the objectives and will in turn inform the production team – GD, PSD, CD

4. Identify and map game mechanics to groups of causes/behaviors – GD, CD
5. Asses feasibility and effectiveness CD, Lead SE, PSD, PSA, CM, GD, Lead DA
6. Determine how to incorporate feedback and progress mechanics to support the performance objectives and desired behaviors – GD, PSD
7. Internally validate feasibility and effectiveness - CD, Lead SE, PSD, PSA, CM, GD, Lead DA

Events

- Deliver, review and validate game concept and mechanics with client (visual concept drawings – start to end + documented details) CD, Lead SE, PSD, PSA, CM, GD, Lead DA

- Finalize game concepts

Deliverables:

Concept Document – Should include concept drawings, documented details on game mechanics and how they will be used to address performance objective, tone, progress and feedback mechanisms

Game Design (Detailed Level)

1. Create wireframes - GD, PSD, (Review with Lead DA, Lead SE)
2. Develop visual treatment – Lead DA, GD, PSD
3. Identify the mechanics intended to increase playability, mapped to the boards/wireframe - GD, PSD
4. Identify the mechanics intended to directly impact performance objectives, mapped to the boards/wireframe - GD, PSD
5. Identify what content will be included as a part of the game mechanic, and what content will be presented outside of game play
6. Flesh out progress and feedback mechanics, (score, messages, user information, generated game content) and map it to real estate on the boards/wireframe GD, Lead DA, PSD
7. Flesh out the narration style, audio tone to support overall tone, and characters – GD, PSD, CM, Lead DA, CD
8. Identify behind the scenes game metrics – GD, PSD, CM, CD
9. Identify method for testing the games impact on performance with the audience – (Informal studies, controlled studies, clinical trials)
10. Develop prototype using wireframe and semi-mature graphics where available, and scratch audio – Lead SE, GD, PSD, Lead DA

Events

- Deliver, review and validate design document and prototype with client - CD, Lead SE, PSD, PSA, CM, GD, Lead DA

Deliverables:

Design Document – Includes user experience walkthrough, all requisite functionality, number of levels, and detailed documentation of functional elements, graphics list, and audio requirements.

Prototype – should contain a single level that demonstrates all of the game mechanics. Should provide insight into visual treatment, although does not need to be final.

Game Production Phase

1. DA Development of Final graphics – DA, GD, PSD
2. SE Development – SE, DA, GD, PSD
3. Conduct playability tests – GD, PSD, CM, QA
4. Implement approved user testing feedback - SE, PSD, GD, DA
5. Demo Challenge with client - CD, Lead SE, PSD, PSA, CM, GD, Lead DA
6. Implement approved client feedback - SE, PSD, GD, DA
7. QA Testing
8. Final Client Review
9. Deliver Final Challenge

Deliverables: Draft Challenge, Final Deliverable

Note: This production phase does not include website, metrics, and portal integration

Addendum:

The Gamification.org wiki has defined 27 game mechanics and made them available under a Creative Commons License. Each of these mechanics falls into one of three different types:

Behavioral: Behavioral Game Mechanics are solely focused on human behavior and the human psyche.

Feedback: These types complete the feedback loop in a game mechanic.

Progression: These types are used to structure and stretch the accumulation of meaningful skills.

This is a table along with descriptions of each game mechanic for reference:

Game Mechanic/Dynamic	Description	Type	Encourages
Achievements	A virtual or physical representation of having accomplished something. Achievements can be easy, difficult, surprising, funny, accomplished alone or as a group. Achievements are a way to give players a way to brag about what they've done indirectly as well as add challenge and character to a game. Achievements are often considered "locked" until you have met the series of tasks that are required to "unlock" the Achievement.	Progression	Engagement, loyalty, Time Spent, Influence, Fun, SEO, User Generated Content (UGC)
Appointment Dynamics	Game dynamics in which at a predetermined times/place a user must log-in or participate in game, for positive effect.	Feedback	Engagement, Influence, Time Spent
Behavioral Momentum	The tendency of players to keep doing what they have been doing.	Behavioral	Engagement, Loyalty, Revenue, Influence, Time Spent
Blissful Productivity	The idea that playing in a game makes you happier working hard, than you would be relaxing. Essentially, we're optimized as human beings by working hard, and doing meaningful and rewarding work.	Behavioral	Engagement
Bonuses	A reward after having completed a series of challenges or core functions. Can be from completing a Combo or just for a specific special task. Also see: Mega Bonuses.	Feedback	Engagement, Influence, Time Spent, Virality, Fun, UGC
Cascading Information	The theory that information should	Feedback	Engagement, Loyalty,

Theory	be released in the minimum possible snippets to gain the appropriate level of understanding at each point during a game narrative.		Influence, Time Spent
Combos	Used to reward skill through doing a combination of things. This also can add excitement or incentivize doing another action after already having completed one. The successful completion of a combo usually comes with the reward of a bonus	Feedback	Engagement, Loyalty, Time Spent, Virality
Community Collaboration	The game dynamic wherein an entire community is rallied to work together to solve a riddle, a problem or a challenge. Immensely viral and very fun.	Behavioral	Engagement, Influence, Time Spent, Virality
Countdown	The dynamic in which players are only given a certain amount of time to do something. This will create an activity graph that causes increased initial activity increasing frenetically until time runs out, which is a forced extinction.	Feedback	Engagement, Fun, Influence
Discovery	Also called Exploration, players love to discover something, to be surprised.	Behavioral	Engagement, Loyalty, Influence, Time Spent, Fun
Epic Meaning	Players will be highly motivated if they believe they are working to achieve something great, something awe-inspiring, something bigger than themselves.	Behavioral	Engagement, Loyalty, Influence, Time Spent, Fun
Free Lunch	A dynamic in which a player feels that they are getting something for free due to someone else having done work. It's critical that work is perceived to have been done (just not by the player in question) to avoid breaching trust in the scenario. The player must feel that they've "lucked" into something.	Behavioral	Engagement, Loyalty, Revenue, Influence, Virality, Fun
Infinite Gameplay	Games that do not have an explicit end. Most applicable to casual games that can refresh their content or games where a static (but positive) state is a reward of its own.	Behavioral	Engagement, Loyalty, Revenue, Influence, Time Spent, Fun
Levels	**Levels** are a system, or "ramp", by which players are rewarded an	Progression	Engagement, Loyalty, Influence, Time Spent,

	increasing value for a accumulation of points. Often features or abilities are unlocked as players' progress to higher levels. Leveling is one of the highest components of motivation for gamers. There are typically three types of leveling ramps: Flat, Exponential and Wave Function		Virality, Fun
Loss Aversion	Game mechanic that influences user behavior not by reward, but by not instituting punishment.	Behavioral	Engagement, Loyalty, Influence, Time Spent, Virality, Fun
Lottery	A game dynamic in which the winner is determined solely by chance. This creates a high level of anticipation. The fairness is often suspect, however winners will generally continue to play indefinitely while losers will quickly abandon the game, despite the random nature of the distinction between the two.	Behavioral	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, Fun
Ownership	Nintendogs, Club Penguin Puffles and other pet ownerships within games create an emotive response from the player to want to protect and look after their animals.	Behavioral	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, SEO, Fun, UGC
Points	A running numerical value given for any single action or combination of actions.	Progression	Engagement, Loyalty, Influence, Time Spent, Virality, Fun, UGC
Progression	A dynamic in which success is granularly displayed and measured through the process of completing itemized tasks.	Progression	Engagement, Loyalty, Influence, Time Spent, Fun, UGC
Quests	Also known as Challenges. Challenges usually imply a time limit or competition whereas Quests are meant to be a journey of obstacles a player must overcome.	Feedback	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, SEO, Fun, UGC
Reward Schedules	The timeframe and delivery mechanisms through which rewards (points, prizes, level ups) are delivered. Three main parts exist in a reward schedule; contingency, response and reinforcer.	Feedback	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, SEO, Fun, UGC
Status	The rank or level of a player. Players are often motivated by trying to reach a higher level or status. Also relates to envy.	Behavioral	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, SEO, Fun, UGC

Urgent Optimism	Extreme self-motivation. The desire to act immediately to tackle an obstacle combined with the belief that we have a reasonable hope of success.	Behavioral	Engagement, Fun
Virality	A game element that requires multiple people to play (or that can be played better with multiple people)	Behavioral	Engagement, Loyalty, Revenue, Virality, SEO, UGC

About the Author

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Over the past 20 years Mr. Low has led the artistic creation of more than 500 technology-based training and performance solutions. These projects have been recognized with over 100 industry awards since 1998. John provides Creative direction on projects, and consults with clients on how best to use digital media, and advanced learning technologies to achieve organizational goals. Current focus areas include serious games and virtual environments; and the use of mobile technology and augmented reality for training and performance support.