2008

Department of Defense Advanced Distributed Learning Game Community Roadmap

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Purpose

The purpose of this document is to provide the Department of Defense (DoD) Game Community with a reference to help focus the direction of their efforts. In support of the DoD Game Community, ADL employs a structured, adaptive, and collaborative effort between the public and private sectors to develop the standards, tools and business models for the game-based learning environment of the future.

Although there are many routes to a destination, this Roadmap gives a direction to the DoD Game Community to focus on.

A reference to help DoD focus its game efforts

What's in it for you?

Simple, really:
- Ever wonder what other game projects there are in DoD?
- Ever think "I bet somebody else already solved the problems I'm having on my game project?"
- Ever wish somebody could tell you "been there, done that" and what does and doesn't work on a military game project?
- Ever wonder why your small game project costs 10 times more than the huge project on the other side of the room with a different contractor?
- Does your contractor "get it," or are they just a bunch of middle-aged M&S guys who SAY they get it? Or worse, middle-aged academics who SAY they "get it?"
- When you're going over budget and about to lose that promotion to O-6, ever wonder if there's another project going on just like yours where you might have been able to save money instead by working together?
- Ever want to just get out of the office for a few days and BOGSAT with others who do "get it" like you do?

You found the right place.

Background

The Department of Defense (DoD) is faced with challenges in expanding technology-based solutions that can make Warfighters more efficient, effective, knowledgeable, and flexible. Of growing important to the DoD is the potential of using the derivative technologies and principles of the electronic software industry for game-based learning in the armed forces for increasing combat readiness. The recruits of today not only understand technology in everyday use, they expect it. These young recruits are "digital natives" who were raised in a digital environment surrounded by inexpensive, yet highly interactive gaming systems. To get the most from our new "best and brightest," new research, policies, guidance, and instructions focusing on military game-based learning

needs to be created. The objective of this Roadmap is to establish a direction, led by OSD, within the military training commands to determine a consolidated approach to incorporating derivative game technology and design principles for training purposes, and recommend an appropriate role for the ADL Initiative. As such, this Roadmap should examine subjects including, but not limited to, standards, design principles, business models, operational restrictions to game-based learning, cultural barriers, and lessons learned.

What is a Roadmap?

A roadmap gets you from here to there

A Roadmap is not a Strategic or Implementation Plan. Like a regular map, a Roadmap is designed to give a quick and easy visual understanding that actors can use to focus their energies on. Although there are many routes to a destination, a Roadmap gives a particular direction to focus on.

Gaming Defined and Undefined

The difference between a game and a simulation is not an easy distinction. As Aldridge (2006) told the audience at the Training 2006 Conference and Expo, "If your company doesn't like the word 'game,' use 'simulation.' If they think a 'simulation' is something boring, use 'game.'" There are several different definitions, stated differences, stated similarities, and variations of definitions in today's literature. The definitions offered by the Defense Modeling & Simulation office glossary of terms offers some guidance (DMSO, 1998): "Game: A physical or mental competition in which the participants, called players, seek to achieve some objective within a given set of rules."

However, this is not a mandated definition for use throughout DoD. The idea of "game" is far more reaching than just using immersive technology to make video games. The elements of a game, engagement, rules, objective(s), and challenge(s), are what makes a game. Such elements do not need to be electronic. In the language of the Modeling and Simulation community, such games may be live, virtual, or constructive. Games may be hybrids of any and/or all three.

Some DoD organizations are so against just the word "game," that internal advocates are now calling it "Immersive Learning" or "Immersive Worlds."

You define your games, not us.

Therefore, ADL declines to define the word game as used throughout DoD.

What's important?

Recent collaboration in DoD Gaming brings to light at least three areas the community thing necessary to address during the formation of the community:
- Standards
- Design
- Business Model

Each is discussed in detail.

Standards

The Department of Defense is a pioneer in advanced distributed learning. DoD's influence and willingness to collaborate with industry and academia have contributed to making the market place for courseware-development software both prolific and competitive. This may help mitigate problems traditionally caused by software packages predating the development of industry standards. As potentially one of the largest users of courseware-development, delivery, storage, and management systems, the Department of Defense can influence industry trends. To meet Department-wide needs, there must be standards for courseware interoperability, that are compatible among tool vendors and that do not sacrifice quality, transparency of operations, or efficiency of storage, manipulation, and management.

What Standards do we need, if any?

On January 31, 2000, the Department of Defense released the Sharable Content Object Reference Model (SCORM) for public testing, evaluation, and comment. The release of the SCORM marked the culmination of extensive cooperative efforts across the public and private sectors. This common specification for instructional software will promote interoperability and reuse across the department, the federal government, academia, the private sector, and beyond. The SCORM is a *sine qua non* -- a key technical enabler for advanced distributed learning.

SCORM is a collection of specifications adapted from multiple sources to provide a comprehensive suite of e-learning capabilities that enable interoperability, accessibility and reusability of Web-based learning content.

What Approach?

Game-based learning can enjoy the same money and time saving high-level attributes that SCORM conformant courseware does. Games that are interoperable, reusable, and accessible can make more efficient, effective, knowledgeable, and flexible Warfighters. The SCORM specification helped define the e-Learning industry during that industry's infancy. The video game industry, however, is an already mature industry with its own set of standards for its own purposes.

New standard or No new standards?

The standards question comes down to this: *How can we make game-based learning standards-based so we enjoy the benefits of interoperability and reusability?*

There are four basic approaches to answering the question:
1. Have the SCORM specification applied to games as if the games were just like any other sharable content object.
2. Leverage the video game industry's standards and change the learning environment to fit those standards.
3. Hybrid approach of 1 and 2 above.
4. Adopt game-design principles that enable games to communicate with SCORM conformant softwares such as Learning Management Systems or SCORM conformant content.

Like most of the areas discussed in this document, the ADL Initiative is looking to the DoD Game Community to recommend answers to such questions.

Sharing Games?

To share game-based learning throughout the DoD, an open, standards-based model for how to design and implement software systems for the purposes of discovery, sharing and reuse of learning content through the establishment of interoperable federations of learning content repositories is needed. The ADL-Registry is designed to fill this exact need.

Designed to be an enabling model to bridge the worlds of learning content management and delivery, and content repositories and digital libraries, CORDRA aims to identify and specify (not develop) appropriate technologies and existing interoperability standards that can be combined into a reference model used to enable a learning content infrastructure. The ADL Registry is not a repository of content, but that of a searchable index of content metadata that can be resolved to content located in distributed repositories. Initially the ADL Registry will be simple and services will be added as policy issues are addressed. Anyone will be allowed to search the ADL Registry through a portal*.

For the first time the ADL Registry will allow search, discovery, identification, resolution and retrieval of content. This should enable "just in time" delivery of content over time. The ADL Registry is beginning its early operational stages. How does, or can, the Registry and Repository system be of good use with games? Is it appropriate for whole games to be registered and shareable? Or, does it make more sense that shells, maps, levels, scenario, characters of smaller size be registered?

Design

The Games Generation customarily sees graphics before text and will focus on visual images before words. Being able to read such images is a form of literacy in its own right, which presents important implications for traditional learning and instructional design (Gee, 2004). Semiotics is the study of how meaning is constructed and understood through visual images.

We need good game-based learning design principles.

Gamers tend to process information in a parallel rather than linear fashion. Rather than mastering one step of a process and then building on it to move to the next, they experience various portions of a learning experience randomly or simultaneously, developing a context that eventually leads to mastery (Prensky, 2000). For gamers, this random access to inputs versus systematic access represents the norm among gamers, who sometimes feel constrained or bored by systematic structure (Dickey, 2005). Finally, gamers see technology as their friend and are unafraid to experiment with it. From games to cell phones, gamers see everything as working in a similar manner, which increases comfort levels among gamers as they typically have experience with at least one technology platform ("Gaming Draws Interest," 2005). As active learners, gamers value highly exploration and fantasy, much to the frequent dismay of the passive, reality-based learners of previous generations. Similar conflict can occur due the gamers' value of play versus work and lack of attention to detail or first-time quality of product. There is a tendency among gamers to expect the opportunity to redo if necessary (Beck & Wade, 2005).

> It's a generation brought up on video games, and the experience has defined the way its members see the business world, how they think about work and risk and success, and what they expect of themselves. These attitudes can be confusing to boomers—in fact, to anyone who doesn't intuitively understand game culture. (Beck & Wade, 2005, p. 48)

Consequently, the questions begs to be asked "how do you design learning for such a group of people?" What is "good" instruction design for the semiotic domain?

What principles are being used now?

There are few, if any, practical game-based learning models that can or are being used for instructional design. Traditional Instructional Systems Design (ISD) is very different than basic video game design. Yet, products are being created today within DoD claiming to be "game" or "game-based learning" products. What are the design principles and approaches being used on these DoD projects? Where are the design models and design principles catalogued? Who has access to such information? Can it be shared? Do these design principles work or are they just ISD with technology or games that miss teaching the content?

Consensus of GBL Design Principles

ADL looks to the DoD Game Community to share, explore, and develop a set of Game-Based Learning Design Principles for DoD-wide use. Answering the questions of the immediately preceding section should help with the "share." Understanding the different models available will help with the "explore." Seeing and reconciling the conflicts between traditional instructional design and video game design will help with the "create." Modern models to build learning, such as John Keller's Attention-Relevance-Confidence-Satisfaction (ARCS) model and game design's Engagement-Goals-Rules-Challenges model are very similar are offer a starting place of commonality.

What Design?

Part of the consensus building for game-based learning design principles is the acknowledgement that instructional systems design and video game design are two separate domains of expertise. There are logical arguments stating ISD and game design are mutually exclusive. There are other arguments stating modern principles of motivational ISD is not that different than game design. So, is it Instructional Systems Design or Game Design?

There are four basic approaches to answering the question:
1. Use ISD with game technology.
2. Use video game design with the learning content as "story" material.
3. Hybrid approach of 1 and 2 above.
4. Create a totally new Instructional Game-Based Learning Design system that leverages both modern ISD and video game design.

How can we create a framework to share?

Communities of Practice can be thought of as people with similar jobs learning from each other how to do their jobs better. Communities of Practice are focused around sharing knowledge through collaboration and innovation. They are driven by their shared domain of "real work" and the recognition of their shared need to learn from each other in a social context. These webs of people are connected together through shared context, common language, and common purpose and goals. They come together, in a shared space, to learn from each other, solve problems together, create new understanding, mentor each other, laugh together, and create meaning together. Members freely share their tacit experience though conversations, interaction with each other, and the building or relationships. Communities of Practice facilitate knowledge and share a domain of practice across operational, functional and organizational boundaries; and define themselves by their knowledge. (Blunt, 2003)
Eight elements for building good communities of practice include:

- Purpose: any good Community of Practice must have a fundamental reason for existence around a shared purpose.

- Shared Space: is vitally important on many different levels. At its shallowest, it's a place for people to gather. Having a shared space brings people together in a socially enabling context. A common space can build trust.

- Group Identity: community identity is important because, realize it or not, most of us "relate" to how we belong to identifiable communities or groups.

- Personal Identify: deals with our reputation within the community. How am I perceived by others within the community? How do I build a good reputation and build status within the community?

- Sharing Culture: this is the "Sharing Knowledge is Power" thing. A sharing culture will foster trust building and relationship building.

- Negotiated/Self Governance: is how we figure out how we will behave in the community. What's the community etiquette?

- Feedback, Feedback, Feedback: If the needs and requirements of the community are not being met, people will leave.

- Technology: is an enabler. A good Community of Practice can thrive with no technological help. Yet, for some Communities of Practice whose members are widely distributed geographically, technology is essential.

Business Model

Some educators see games as a useful and perhaps even necessary learning environment suitable for learners of all ages. However, there are obstacles to this blending. One issue concerns the translation of *fun* elements in games to settings of institutional learning where intellectual content is king. Adolescent students often complain that they cannot see the relationship between school participants and real life. Adult learners view the manipulation of teaching strategies for entertainment value as transparent and reject hybrid experiences as patronizing. Critics of educational game design say that products have erred too far in the direction of weightiness and away from the attraction of play. Indeed, "designers have been tempted to hold children's play at arm's length, by referring to games for education as 'serious' games and thus completely different from the idle pastimes of the young" (Corbeil, 1999, p. 163).

To get the most from our new *best and brightest,* new research into game-based learning must be done. This study may help answer some of the questions now surrounding game-based learning and determine the relationship between the use of video games and learning as measured on standardized tests. It provides answers to both skeptics and supports.

What is the business model for DoD game-based learning? Designing and developing games can be very expensive. Where is the evidence that game-based learning is an effective, efficient, and economical way of training? What domains (emotional,

intellectual, psychomotor) do games teach best? What genres of games teach which domains best? For each one of these questions, at what point does it become economical to commission a game for training? How large must the audience be before it become cost effective?

Most importantly, what problems are trying to be solved using games and why?

Does it work?

Three research studies were conducted at a national university to examine the difference in academic achievement among students who did and did not use video games in learning. Three different video games were added to approximately half the classes of freshmen Introduction to Business and Technology courses, 3rd year Economics courses, and 3rd year Management courses. Identical testing situations were used in all courses while data collected included game use, test scores, gender, ethnicity, and age. ANOVA, chi-squared, and t tests were used to test game use effectiveness. Students in classes using the game scored significantly higher means than classes that did not. There were no significant differences between genders, yet both genders scored significantly higher with game play. There were no significant differences between ethnicities, yet all ethnic groups scored significantly higher with game play. Students 40 years and under scored significantly higher with game play, while students 41 and older did not. These studies add definitive research in the area of game-based learning. The DoD now has studies proving the efficacy of digital game-based learning and how it can improve learning.

What metrics are there?

Most will agree that metrics are important to collect, yet hard to determine. What metrics will show the outcomes from game-bases learning? The following metrics are offered only as a suggestion:
- Money spent
- Time-to-train
- Cost per trainee
- Training scores
- Trainee throughput, capacity, production

How do we collaborate?

ADL offers the following ideas as a way to begin collaboration within the DoD Game Community:
- http://adlcommunity.net/course/view.php?id=23 is a website specifically designed for ADL Game-Based Learning participation
- Annual, perhaps more often, DoD Game User's Conference where DoD Game stakeholders can gather to share information, best practices, and war stories related to DoD Gaming
- Quarterly, perhaps more often, webinars about game design, development, production, and evaluation.

ADL offers the following strategy to collaborate:
- Work closely with industry, government and academia to promote common, open, international specifications and standards that enable reuse and interoperability of games
- Promote widespread collaboration that satisfies common needs
- Enhance performance with emerging game-based learning technologies
- Promote a coordinated implementation process with incentives for organizational and cultural change.

What policies/ oversight is needed, if any?

At this time, ADL does not envision any new policies, guidance, or instructions (PGI) to regulate the DoD Game Community or DoD Game projects. However, a time may come when the use of PGI may be considered useful and appropriate. The DoD Game Community has the opportunity to help develop the case for or against policies. Grass-roots advocation one way or the other will be listened to by ADL personnel.

The Way Ahead

Again, this is an informal roadmap to help direct, informally, the efforts of the DoD Game Community so they may learn from one another, academia, industry, and the rest of the public and private sectors.

Internal responsibilities

The Director of the ADL Initiative shall appoint an ADL Game Evangelist expert from his staff to coordinate and lead the information sharing efforts of the DoD Game Community.

Partnering opportunities

A large part of the direction this Roadmap gives will allow organizations to meet, learn from, and partner with other organization inside and outside DoD on their game projects.

Research

The previous paragraph only describes one set of studies in a very narrow, and non-DoD, context. More research needs to be done to establish the efficacy of game-based learning. Parochial pedagogy needs to be reassessed in light of modern times where most children are raised with an arsenal of consumer electronics at their commend. What genres best teach Bloom's hierarchy of learning.

How much research is too much research? Is it best to wait for all the research to be done to start game-based learning? How many years, or decades will that be? Should little to no research be done and learn from trial and error because we "know best?" How expensive will that be? Should the Pareto principle of 80/20 be applied giving 20% research before 80% production?

## Phased Participation Timeline

A DoD Game Community conference/summit/ workshop shall be held not less than annually. During the first few years of this Roadmap, gatherings may be more often and may be of general or specific nature depending on the needs to the community. In order to "crawl, walk, run," a phased participation approach to the community will be followed.

Gather Military Game PMs

Military Game PMs + Game Vendor PMs

Military Game PMs + Game Vendor PMs + Game Companies

Add Experimental & Analysis Communities

Initial participation will be offered to Military and Government game project stakeholders. Why start with military and government? So at the beginning there will be no "sales" pressures.

Next, vendors and contractors currently supporting the afore mentioned military and government stakeholders will be invited to participate. Why them next? Because as the "loyal" vendors already under contract, they know and share many of the issues being experienced by their military/government clients.

Third, game industry companies will be invited. Why invite them? As of this writing, with the exception of America's Army, none of DoD's game projects involve the 170 game companies listed on Gamasutra's 2006 "Best Game Companies" list. Why is it so many organizations are touting they are doing "game" projects, but no one is involving the game industry?

Fourth, the technologies associated with video games may be suited for other DoD interests besides training, education and performance support. The Experimental and Analysis communities may benefit from the derivative technologies the game community is currently using.
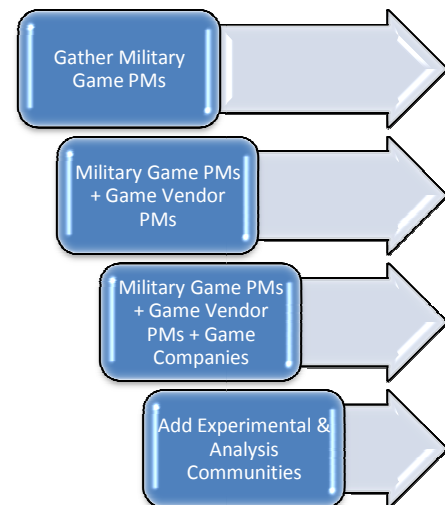
The Players

OSD/ADL Initiative

The Office of the Under Secretary of Defense for Personnel and Readiness (OUSD P&R) was tasked with leading a collaborative effort to harness the power of information

technologies to modernize structured learning. Through the sponsorship of the OUSD P&R, the creation of the Advanced Distributed Learning (ADL) Initiative was formed as a developer and implementer of learning technologies across the Department of Defense (DoD).

ADL employs a structured, adaptive, collaborative effort between the public and private sectors to develop the standards, tools and learning content for the learning environment of the future. The vision of the ADL Initiative is to provide access to the highest-quality learning and performance aiding that can be tailored to individual needs and delivered cost-effectively, anytime and anywhere.

What ADL offers

ADL offers the following ideas as a way to begin collaboration within the DoD Game Community:
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- Enhance performance with emerging game-based learning technologies
- Promote a coordinated implementation process with incentives for organizational and cultural change.

ADL also offers time, people, and other resources toward the goal of providing the Department of Defense (DoD) Game Community with a reference to help focus the direction of their efforts. In support of the DoD Game Community, ADL employs a structured, adaptive, and collaborative effort between the public and private sectors to develop the standards, tools and business models for the game-based learning environment of the future.

What ADL does NOT offer

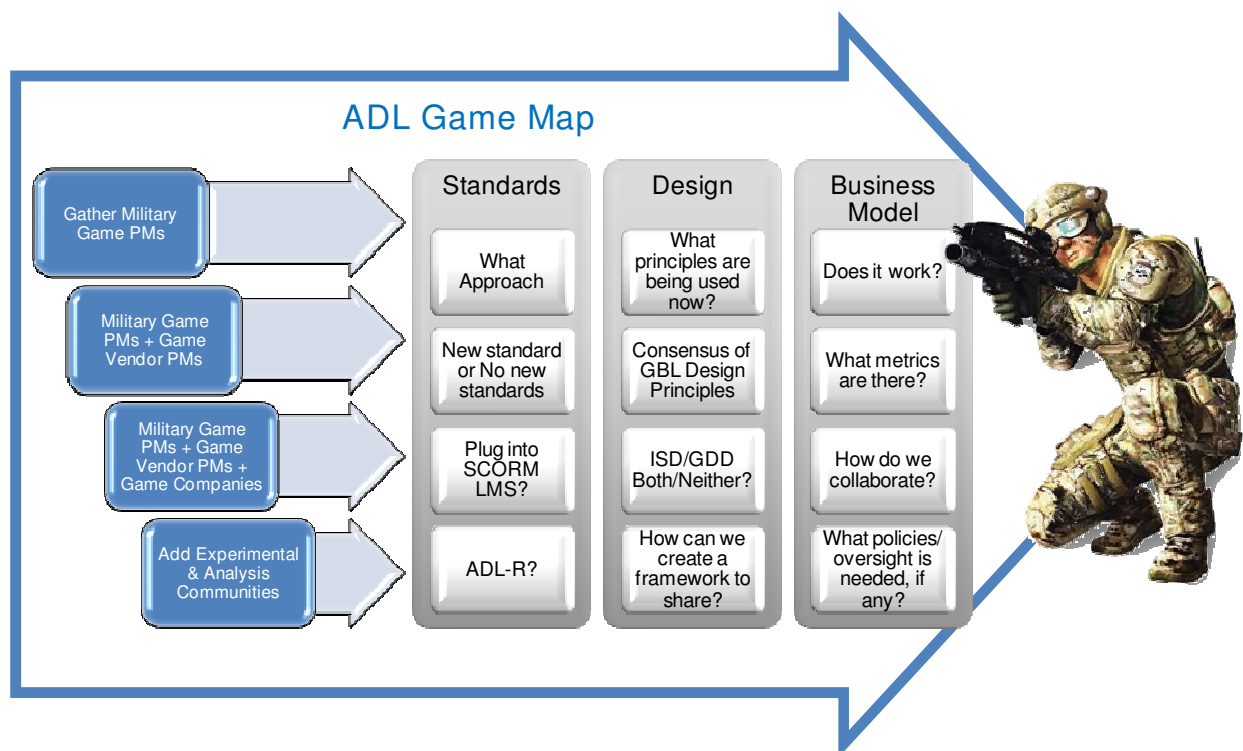ADL is NOT an alternative for you to find funding for your project.

ADL does NOT endorse any vendors or contractors.

ADL is NOT a business development playground.

Summary—the Roadmap

As previously stated, this document is offered to provide the Department of Defense (DoD) Game Community with a reference to help focus the direction of their efforts. In doing so, ADL reaches back to its roots of collaboration and cooperation. ADL believes the future Warfighter deserves the best we can give them in training innovation. As such, we believe the areas ADL can help the DoD Game community with include:

- Creating and maintaining a collaborative community of practice for the DoD Game community.
- Make game-based learning standards-based so we enjoy the benefits of interoperability and reusability.
- Create a totally new Instructional Game-Based Learning Design system that leverages both modern ISD and video game design principles.
- Develop an adaptive Business Model that not only shows game-based learning works, but also shows which game environments best teach what kinds of learning, and shows the economics of the proposition.

ADL Game Map

Gather Military Game PMs	Standards	Design	Business Model
Military Game PMs + Game Vendor PMs	What Approach	What principles are being used now?	Does it work?
Military Game PMs + Game Vendor PMs + Game Companies	New standard or No new standards	Consensus of GBL Design Principles	What metrics are there?
Add Experimental & Analysis Communities	Plug into SCORM LMS?	ISD/GDD Both/Neither?	How do we collaborate?
	ADL-R?	How can we create a framework to share?	What policies/ oversight is needed, if any?

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