Continuous Learning Environments

Incorporating Performance Metrics into Next Generation Simulation-based eLearning Environments for Military and Law Enforcement

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The information revolution; Impacts on Military and Law Enforcement

At the end of the 20th century, the technological advances of the information-age brought about significant transformations in learning. The rapid growth of internet technologies fueled by powerful and affordable computer platforms collided with the revolution in pervasive computing and wireless technologies all of which have had powerful effects on learning. These advances have not only had a profound impact on our military and law enforcement communities, but additionally, have contributed to seismic realignments of priorities that have reshaped core principles and doctrine. Thus, our military is evolving from a force primarily centered upon the doctrine of massive firepower and deterrence, to one of mobility, intelligence gathering, synchronicity and battlefield information dominance. The recent terrorist attacks of September 11th are causing similar changes in the structure of Law enforcement, pubic safety and first responder training. Our Law enforcement community is transitioning from a largely quantitative, skills-based view of policing, to one that places higher emphasis on intelligence gathering, collaboration, and crime prevention. These changes seem to be in lock step with the macroeconomic trends sweeping our country that are rapidly shifting emphasis from manufacturing to more knowledge-based, information-centric industries. From the perspective of teaching and learning we could say that the emphasis has shifted from Skills to Knowledge.

Skills → Knowledge → Performance; The Third Wave

The 21st century will most likely see the fulfillment of this trajectory and we predict that its culmination will be the emergence of the "performance-centric" economy which will permeate all aspects of society. The emphasis on performance will not only require a perfect balance between skills and knowledge but will focus these attributes upon the fulfillment of a specific mission or higher purpose.

As technology fueled advances in teaching and learning over the last decade, we have witnessed the advent of eLearning which has evolved from predominantly linear approaches to more advanced PBL (problem or performance based learning) along with the incorporation of eLearning within the greater context of classroom-based instruction. Until recently, blended learning, the combination of advanced learning technologies as an extension to the classroom environment, seemed to provide the richest learning experience for most forms of instruction. Many organizations have either adopted or plan to adopt blended learning as a core element of their instructional methodology. No doubt eLearning has brought about significant advancements in our ability to deliver instructional content to students. The "Performance-centric" organization however, will require new approaches to teaching and learning that go beyond the traditional or even newer eLearning approaches.

CLEs -- Continuous Learning Environments; Always-on instruction

Over the last 24 months, technologies, have emerged that will completely redefine not only the boundaries of learning, but what a learning activity is. These technologies include robust virtual and mixed reality training environments, mLearning, based on

mobile computing platforms and intelligent embedded training tools. Teaching and learning have already been transformed from discrete activities that a student undergoes to a more decentralized approach. It will not be long before learning evolves into a just-in-time, on demand commodity in support of the overall performance of the organization. The ubiquitous internet with its unprecedented information aggregation and access provides just-in-time information. 20 years ago, the notion that we could simply "Google" for information when we need it would have sounded preposterous. Soon however, technology infrastructure will support the delivery of discrete, compact and re-purposable learning objects for whatever learning activity we need to access in order to perform a certain task or fulfill an immediate objective.

Just as fictionalized in the hit movie "The Matrix" where the lead character asks mission control to download a program for flying a helicopter and immediately thereafter possesses the skill, knowledge and ability to do so, learning is becoming a continuous stream of information gathering events. These events can support immediate activities or provide fully immersive, virtual or mixed reality, interactive environments that enable the pursuit of experience or "wisdom" within the learner. Continuous learning environments are the seamless blending of myriad forms of instruction, intelligent delivery platforms and contextualized and adaptive learning content that exist both in the bricks and mortar as well as the virtual world. Within a CLE, 3-Dimensional learning takes place which emphasizes the positive effect of combining content, application, and context. Content consists of the facts, techniques, theories and other types of knowledge applicable to a particular topic. Application is the appropriate way to employ (integrate) and utilize/use the knowledge gained. Context consists of the situation set in a real world environment and emphasizes deduction and associative thinking.

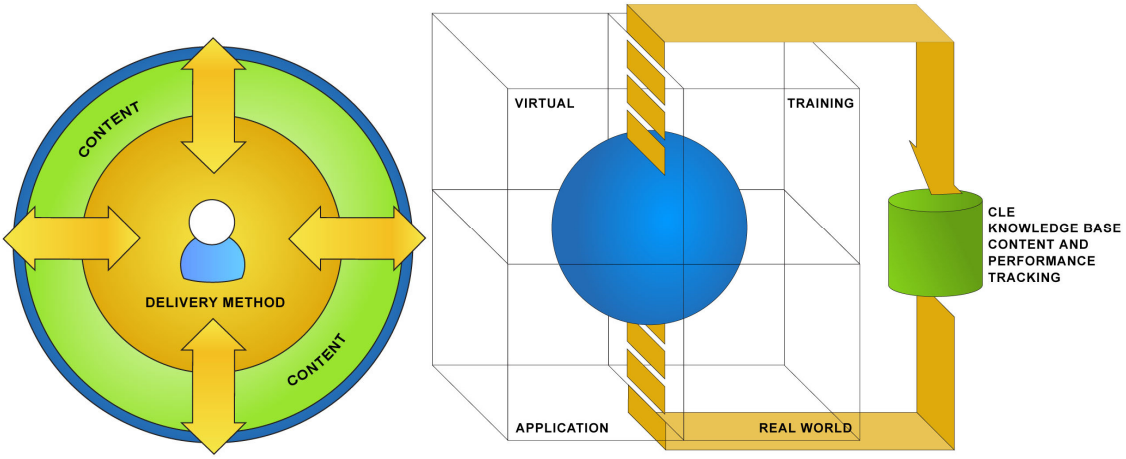

Figure 1:
Illustration of the components of a CLE and their interaction with the student and the CLE knowledgebase

Within a CLE everyone is a student; learning is continuous, and tailored both to each student's specific learning style, but also, contextualized to the particular task at hand. Learning can be encountered in the classroom, during practical exercises, online via the internet, on hand held mobile devices, in virtual reality simulations or embedded within software applications or equipment. In order to be effective in a performance-centric organization, the CLE must posses an underlying cohesiveness that is tied to the organizational mission. This underlying principle aligns the learning experience to coincide with the organization's fundamental objectives and a student's sense of higher purpose.

Evaluation of the CLE poses a practical challenge; How do we incorporate reliable, real-time metrics to measure continuous workforce improvement against the measurable goals outlined in an organization's mission-based learning strategy? What metrics can be used to tie training activities within the CLE to the overall performance of the organization? By exploring the underlying foundation for this paradigm shift in teaching and learning perhaps we can shed light on some possible solutions to the vexing problem confronting learning organizations wishing to track both quantitative and qualitative aspects related to organizational performance.

Understanding Performance; Linking needs, motivation and thought

Participants in the learning process, whether it is the traditional classroom, the blended learning approach, or the continuous learning environment, define quality by the satisfaction of their needs and wants. A need usually implies something that is required (essential) to the well being of the individual or the organization. Often times, a want is something that is a "like to have", but is not essential to the development of the individual or the organization (Clark, 1999, p. 18). Maslow (1987) believed that people shared a hierarchy of basic needs, but the most important is self-actualization, "the desire to pursue a vision, or a unique purpose in life" (as cited in Clark, p. 18).

Herzberg (1959) following a similar approach with a hierarchy of needs in the workplace identified "hygiene factors and motivational factors' (Clark, p. 25). Participants in the learning process are best motivated if they feel as if they are stakeholders in the learning outcomes. Intrinsic motivation, the feeling of "doing the right thing" for the right reasons propels learners in the acquisition of knowledge, skills, and attitudes critical to the organization.

Benjamin Bloom developed a widely used taxonomy of six thinking levels that human beings use in their everyday life, encounters, and learning. This taxonomy serves as an invaluable tool for trainers and educators as they endeavor to analyze, design and develop the knowledge, skills, and abilities of students in specific subject matter areas. Bloom's levels of thinking proceed from the simplest to the most complex level of thinking. The levels are: **knowledge** or memorization; **comprehension** or understanding; **application** or using the information gained; **analysis** or taking

apart; **synthesis** or putting pieces of knowledge together; and **evaluation** or judgment.

These early pioneers attempted to define the underpinnings of learning, its relationship to thinking and motivation. It is on the basis of these insights that we can begin to understand the fundamental link between continuous learning environments and organizational performance.

How, where, when, why; putting it all together

If we juxtapose Bloom, Maslow, and Herzberg to the stages that exist in a law enforcement officer's career (see Table 1.0 on page 6) we gain insight into training approaches that can be utilized to advance understanding at each stage of professional development. Though learning is a fluid activity and there are no clear demarcations as the learner advances through each stage, this comparative analysis provides a solid theoretical and pedagogical foundation for the design, and development of law enforcement training.

Hertzberg's "two factor theory" provides insight into the importance of "hygiene" and "motivational factors" on the health and welfare of an organization and its employees. Bloom's "taxonomy of thinking levels" enables the instructor and training developer to match thinking levels, in both student and graduated Law Enforcement Officers, to appropriate training methods and styles of delivery to maximize both their ability to learn and the effectiveness of the training experience. Maslow's "hierarchy of needs" gives insight into the types of behavior motivators operating in each student depending upon where they sit in that hierarchy. The "Law Enforcement Officer Guild Stages" provide us with the opportunity to understand which types of knowledge, skills, and abilities take precedence in each of the stages; from apprentice, through journeyman, and the capstone experience of attaining master rank.

This theoretical foundation supports our understanding of how, when, where and why law enforcement training is delivered to life-long learners and can additionally inform us on practical means for measuring the effectiveness of learning that is taking place within the CLE.

Table 1.0—Synthesis of Bloom, Maslow, LEO Guild, Kirkpatrick & Chapnick

Bloom Taxonomy	Maslow's Hierarchy of Needs	LEO Guild Stages	Kirkpatrick Chapman Levels of Evaluation
Knowledge • Remember • Memorize • Recognize • Recall	***Belonging/Relatedness*** - • to- peers, study groups, teams, Instructors	***Apprentice*** • Student/trainee At academy	**1, 2**
Comprehension • Interpret • Translate • Describe on own • Organize-select facts	***Belonging/Relatedness*** • Classmates/teams/ Presentations	***Apprentice*** • Student/trainee At academy	**1, 2**
Application • Problem solve • Apply information • Use facts, rules	***Belonging/Relatedness*** • Culminating practical Exercises	***Apprentice*** • Student/trainee At academy	**1, 2**
Analysis • Subdivide and put It back together • Find underlying Structure of communication • Separate whole into component parts	***Belonging/Relatedness*** • Culminating practical Exercises ***Esteem-self-confirmed*** • Achievement graduate, competent growth on-the-job	***Apprentice*** • Student/trainee At academy ***Journeyman*** • Graduates a Duty station working	**1, 2** **2, 3**
Synthesis • Create original product • Combine ideas to form new whole	***Esteem-self-confirmed*** • Achievement graduate, competent growth on-the-job ***Self-actualized*** • Achieve potential, Self-development, Creativity, Self-expression	***Journeyman*** • Graduates a Duty station working	**2, 3, 4**
Evaluation • Make value decisions about issues • Resolving differences of opinion, • Performance • Development of opinions, judgments	***Self-actualized*** • Achieve potential, Self-development, Creativity, Self-expression	***Master-Officer*** • First line supervisor and up • Do all previous categories well • Do all categories independently without mentoring or coaching	**4, 5**

Knowledge Acquisition, Application; Supporting Instructional Methods and Technologies

The paradigm shift to a continuous learning environment (CLE) causes a dramatic change in the very definition of knowledge acquisition. Acquiring knowledge and use of knowledge used to be a linear process. In other words, we first learned something and later applied the knowledge we gained to a given real world situation. The student's immersion in the CLE will compress the cycle of learning and application so tightly that often the lines between the two will become blurred. Because of the abundance of learning events and opportunities within the CLE, it will be essential to develop *context filters* and *intelligent virtual agents* as vehicles for concentrating and focusing the learner's attention on the pertinent knowledge needed to perform the job related task at hand. Context filters will *contextualize* learning events directly within the context the learner finds themselves in, intelligent virtual agents on the other hand will index, find and deliver learning events based on a given immediate need and present those to the learner through the delivery method of their choice.

With continuous learning environments, learning and training is increasingly embedded within the tools, equipment, and context in which it is to be used. The potential in this approach is enhanced performance effectiveness, reduced training costs, and fewer safety issues. The instructional designers of the future are challenged to develop training that is:

1. learner-centric
2. contextualized within the learning environment
3. just-in-time
4. adaptive and flexible
5. often collaborative
6. based on newly emerging networked technologies (Bonk and Wisher, 2000).

Additionally, learners will require access to always-on, continuous embedded training, and assessments as well as just-in-time (when needed) and just-in-place (where needed) performance support. In fact, organizations like the military are mandating that embedded training solutions be implemented throughout its forces.

With movements towards developing learner-centered approaches, user needs and goals will drive the design rather than traditional design processes. Reigeluth (1999) states that new models of instructional design will need to rely more heavily on input from user-designers. This requires that we adopt and adapt models of instructional design that support the vision and goals of continuous learning.

The first step in this process is gaining an understanding of the role of learning theories, methodologies, and strategies as part of designing this new learning environment. It is important to separate learning theory (our values about learning) from methodologies (the general approach to a given learning environment) and the instructional strategies and instructional tactics to learn a particular piece of content or development of a skill (e.g., a lecture, group brainstorming or field exercise).

The importance of learning theory is to identify the beliefs and values about learning. Theory provides the structure and guidance for applying a certain design methodology (at the macro level) or a teaching strategy (at the micro level). It gives context and meaning to how methodology and strategy should be applied based on the beliefs of how learning occurs (Reigeluth, 1999). Without a theoretical foundation, designers often abstract and interpret methods through their own existing frameworks, (Bednar, Cunningham, Duffy & Perry, 1992; Kirkley 2003). This can result in designers engaging in trial-and-error often creating problematic and inconsistent designs of learning and instruction. CLEs require innovative and always-on methods of assessment that will fundamentally change how the major stakeholders in the learning process will participate in the learning environment.

In alignment with these theories of learning, there are multiple methodologies available to support and facilitate learner negotiation of understanding. Broadly termed under the umbrella of **inquiry-based learning**, these facilitate engaging learners in a process of inquiry centered on authentic problems or cases. As they examine these cases or problems, they use real world resources, tools, and people. Three of these learning methodologies; **problem-based learning**, **case-based reasoning**, and **anchored instruction**, provide good examples of methodologies that can be used effectively within continuous learning environments. These are not the only applicable approaches; however, they are well known as they have been used in a wide range of learning environments from business and medical school to K-12 learning as well as military training environments.

Problem-based Learning

Problem-based learning, focuses on promoting the learner's authentic engagement in an ill-structured issue or problem that is a legitimate and central issue in the topic area. These problems are complex and authentic often resulting in multiple right solutions. The structured process supports learners with generating hypotheses, gathering information to evaluate those hypotheses, and being able to discuss and defend a perspective (Savery & Duffy, 1996). The PBL methodology has been widely adopted in professional graduate programs, such as medicine (Barrows, 1992) and engineering (Woods, 1992). In two research reviews on the use of PBL (Albanese & Mitchell, 1993; Vernon & Blake, 1993), we have examples of some of the outcomes of using PBL. From these two reviews, it was found that PBL often promotes: self-directed learning, use of learning resources, and problem solving and critical thinking skills–a deeper understanding of content and how to apply it in practice. In a few cases, PBL has resulted in less content coverage as compared with traditional curriculums, and some groups of students using PBL did not score as high on standardized tests as students in more traditional curricula (see Albanese & Mitchell, 1993, for more discussion). However, these types of outcomes would need further examination in light of any implementation of the PBL methodology.

Case-based reasoning

Case-based reasoning (CBR) (Schank, Reisbeck & Kass, 1993), uses cases or stories as the central concept in constructing knowledge for the purpose of learning to use understanding to address real world problems. Case-based reasoning is grounded in the theory that much of knowledge is based on stories rather than rules; that is, we use past problems as a basis of expertise for determining how to solve current problems. Thus, by activating these cases stored in memory we are enabled to solve new problems through the process of comparing cases, reconciling similarities and differences, and diagnosing various aspects of learning problems or issues within the case (Kolodner and Guzdial, 2000). Case-based reasoning has been used in a wide variety of training and educational settings, particularly in medicine and business. Also, it has been used as a basis for designing software to support specific aspects of addressing cases within a range of learning environments.

Anchored Instruction

Anchored instruction (Bransford et al, 1990) focuses on creating a realistic anchor or focus that generates student interest and supports the knowledge construction process. Anchored instruction is based on Bransford & Stein's (1993) IDEAL model of problem solving:

I – identify problem
D – define problem
E – explore alternatives
A – act on a plan
L – look at the effects

Much of the work in anchored instruction has been done with elementary students in reading, language arts, and mathematics. Perhaps one of the more well known examples of anchored instruction is the "Jasper Woodbury Problem Solving Series" developed by the Cognition and Technology Group at Vanderbilt under the leadership of John Bransford. (CTGV, 1993). These videodiscs provided scenarios that focused on using mathematics skills to address real world problems. Using the Jasper example, in anchored instruction a learner is presented with a story that offers multiple opportunities to address ill- and well-structured problems unlike PBL in which a large ill-structured problem is investigated.

All three of these methodologies reflect the values and vision of both constructivist (Duffy & Cunningham, 1996) and sociocultural (Vygotsky, 1976) approaches to learning and CLEs where student inquiry and real world problems serve as an impetus for learning. The strength of inquiry-based methodologies is that they focus on facilitating student application and transfer of knowledge to real world environments and applications; help students develop higher-order thinking skills such as critical thinking and problem solving (Blumberg, 2000); and help improve self-directed learning skills. A second advantage of using theory-based methodologies is that by using the common framework of theory, we can provide information about what works with regard to aspects of methods and designs. While each of these methodologies

are unique in how the learning process is implemented, they all support continuous inquiry through the examination of real world issues and problems.

Yet part of the challenge for designers of continuous learning environments lies in understanding how to use theory-based methodologies to inform and guide their designs. By not doing this, we may well limit the advancement of understanding of the impacts of using various methodologies as well as the technologies to support continuous learning.

Technologies to Support Continuous Learning Environments

New technologies are emerging that support innovative content within, and access to continuous learning environments. From Web-based courses using synchronous (chat) and asynchronous (or bulletin board) communication to fully immersive virtual reality-based simulations, these new technologies offer much in the way of potentially advancing the impact as well as the access of continuous learning opportunities.

While many instructional platforms have tended to focus on delivery via a sole technology such as CD-ROM or web-based instruction, we will increasingly begin to see the simultaneous use and convergence of multiple technologies and curricula delivery methods that will support seamless and continuous learning. We already have many examples of convergence within learning environments such as the use of Web-based courses to access simulations in which an online chat is embedded. In fact, blended instruction is a term being used to describe curriculum offered through a combination of face-to-face and electronic mediums (Voos, 2003).

To address the needs of CLE training approaches, mixed and virtual reality technologies are seen as vital to providing innovative, authentic and more complex training environments through the enhancement of reality. With virtual reality (VR), a learner is fully immersed within a virtual world, while mixed reality blends both real and virtual worlds and objects. Two types of mixed reality are: 1) augmented reality (AR), where the real world is enhanced or augmented by adding digital data, such as objects, sound, or touch (i.e., haptics); and 2) augmented virtuality (AV), where a primarily virtual world is enhanced with some real world attributes (Milgram & Colquhoun, 1999).

To provide a better understanding the relationships among these technologies, Milgram, Takemura, Utsumi, & Kishino's (1994) developed a mixed reality continuum. Kirkley (2003) adapted the continuum by adding images demonstrating examples of training environments for each (see Figure 1). At the far right, the virtual environment can be used in both fully immersive and desktop simulations as illustrated in this image from a desktop video game. In considering how to use augmented reality for training and performance support, this example shows the location of underground utilities beneath a street repair project. This could be used to train personnel on maintenance and repair of these systems. On the other hand, the augmented virtuality example provides a scenario of 3D virtual buildings superimposed on a plastic architectural model. This could for instance, provide training on urban maneuvers for Special Operations Groups.

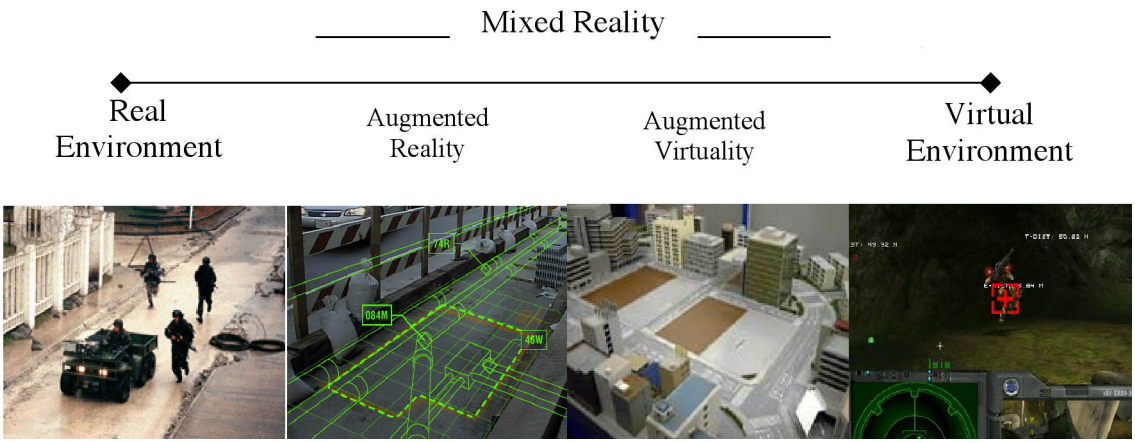

Figure 2:
Mixed reality continuum

Simulations in particular provide a powerful method for using mixed and virtual realities. Simulations often provide contextualized, authentic, open-ended, evolving situations with many interacting variables. Participants take on roles to address the issues that arise, take specific actions, and then see the results of their decisions (Gredler, 2003). With the emergence of mixed and virtual reality-based simulations, even more complex interactions are possible, including visualization, audio, and haptic (or touch) technologies. These types of simulations will enable learners to engage in real-world experiential learning through interaction with mixed and virtual reality environments.

According to Morrison and Aldrich (2003), there are four different types of simulations: game-based, story-based, simulator-based, and virtual product/lab situations. In a game-based simulation, the learner engages in an entertaining experience that contains educational content. The use of these types of simulations is typically found in learning reinforcement practice lessons used after class instruction takes place. The story-based simulation is a highly defined scenario that contains all the content relevant to the learning experience and provides interactive decision-making learning and is used in computer-based training (CBT) lessons. The simulator-based learning, or open-ended learning is that type of simulation in which the learner must do the thinking calculus and make different types of decisions as they would in real job situations, and experience the results. This type of simulation is equivalent to practical exercises used in law enforcement training (such as those conducted at Federal Law Enforcement Training Center). Virtual product/lab situations, or on-screen presentations that contain learning objects and software links enable learners to mimic the characteristics of the real-life counterpart and combine elements of the other three types. Simulated environments serve as the platform for three-dimensional learning that takes place in the continuous learning environment.

While people can learn by participating in any simulation (e.g., observing types of cause/effect relationships), simulations do not inherently teach. Instructional designers need to use a systematic approach to designing simulations by inserting instructional supports such as virtual coaches, scaffolding, and job aids while using debriefing

techniques. By structuring simulated events that force specific learner actions, we can create simulation-based environments that actually do teach.

It is in the scaffolding and instructional design components where learning is most likely to occur. It is also these systematic approaches to designing the learning environment that provide the opportunity to embed assessment and continuous "just-in-time," "just-in-place" feedback and support to learners. On the other hand, instructional design processes can often result in simulations that are too controlled and less engaging (and less fun) unless the designers understand how to balance design of the experiences with the need to teach specific content. The ideal is for training environments to look exactly like the job environment thus, improving transfer of skills to job performance.

We believe simulations will be the primary means of engaging in authentic problems but the learning environment will need to help instructors and learners to successful employ a variety of learning tools and content. In Problem-based Embedded Training (PBET) (Kirkley, Kirkley, Myers, Lindsay, & Singer, 2003; Kirkley, Kirkley, Myers, Singer, Sherwood & Swan, 2003), a CLE learning methodology under development for the U. S. Army, soldiers will engage in systematic process that progresses through four stages:

1) **Mission Phase** -- Assignment of a problem
2) **Action Phase** -- Utilizing learning objects and tools to plan appropriate actions in teams
3) **Implementation Phase** -- implementing their plans in a mixed reality or VR simulation
4) **After Action Review Phase** -- evaluation or after action review which may occur face-to-face or online depending on whether the learners are physically in the same location

A majority of the time in a PBET training module may be spent asynchronously online and practicing discreet skills in mini simulations (e.g., proper movement of a ground robot for reconnaissance). However, all of the actions are undertaken in service of solving the overarching problem or mission. All of these components are designed specifically to support the soldiers in preparing for the mission. As a highly structured environment, all of the components are interlinked. For example, the soldiers might discuss and learn a process and develop their own job aid on robotic operation during the Action Phase then, have the system present it to them when needed in the simulation. They might also practice parts of the mission on a desktop virtual reality simulation of the actual live training site and then go to the live training site and engage in the same mission using augmented reality–physically moving about a MOUT site and engaging computer generated forces. This single simulation with two different ways to participating in it, offers a powerful example of next-generation learning environments. Once the soldier returns to the field his systems will know about his learning successes and failures (e.g., improperly maneuvering the robot over the crest of a hill). While on a real mission performing a similar robotic task, the job aid created and used in training could appear to remind the soldier of how to properly move the robot.

While this section has focused on simulations and new technologies like mixed reality to support them, a CLE will make use of many technologies such as online Web forums, classroom lectures, job aids delivered to handheld computers in the field, access to remote mentors, and virtual coaches.

mLearning (learning delivered on mobile computing platforms) provides another example of the power of the CLE to enhance on-the-job performance by delivery of just-in-time, just-in-place instruction. We provide the following 2 scenarios to illustrate this aspect of the CLE within a law enforcement context.

mLearning Scenario 1:

A State Police Officer pulls over a suspicious vehicle (Pick-Up Truck) with out-of-state plates in the vicinity of Hydro-Electric Power Plant. In light of the "9-11" tragedy and security alerts issued by the Department of Homeland Security (DHS), the state police officer recalls some recent warnings, roll-call and in-class training. The three occupants of the vehicle are middle-aged, white males, dressed in work-type clothes that are deceptive in responding to the Officer's questions about their identities, where they are from and where they are going. Though the bed of the pick-up truck is covered by a tarp, the shapes of containers can be discerned under it along with the distinct odor of fertilizer. The officer orders the occupants of the vehicle to turn of their engine and remain in the vehicle.

Returning to his vehicle, the officer radios for back-up and informs the dispatcher of the pertinent information on the truck plates, registration, and reluctance of the occupants of the vehicle to cooperate. Utilizing his in-car computer or wireless PDA, the officer queries the departmental network and retrieves both his recent training and alert notifications regarding domestic terrorism and the vulnerability of public utility plants. The officer remembers from the class that there is a "check-list" for domestic terrorism, a protocol and list of questions that can be asked, and a proper notification list located in a concise 3-minute "learning object" available on the network. The officer quickly accesses the learning object via his mobile computer and reviews the "check-list", while back-up arrives on the scene.

Based on the information provided in the "check-list" and list of questions, the officers on the scene properly decide to secure the vehicle and detain its occupants until the appropriate personnel could be notified and brought to the scene.

Accessing the CLE via mobile computer allowed the state police officer to instantly recieve refresher training and to quickly review DHS alert notifications, make the proper decision and to take the appropriate action. Safety of the officer, the Hydro-Electric Plant, and the community were resolved in a matter of minutes.

mLearning Scenario #2:

As a part of an ongoing armed robbery investigation, a veteran city police detective is required to interview a Muslim woman at her home, because she may have been a

witness to the armed robbery. Normally, the detective and partner would drive out to the residence and conduct the interview. Recalling a previous training event relating to the cultural differences existing within the Muslim community the detective wishing to refresh his memory accesses the learning network from his desktop computer. The training he received is easily accessible and he refreshes his memory on cultural sensitivity and procedures. Under "Important Cultural Dimensions/Muslim", the Detective learns that he should call first and set up the interview with the women at a time when her husband can be present. He further learns that in a Muslim household, it would be improper for the women see another man (even a police detective) without the presence of her husband or appropriate family member.

The learning module strongly suggested that the detective to take female officer along for the interview. Because of just-in-time learning, the detective took the appropriate action and, as a result, had a productive interview. Needless to say, not following these procedures could have turned out very poorly and resulted in harm to the investigation.

Like the vehicle stop in Scenario #1, the police detective used the learning object/module (15-minute) to learn about some important considerations, when interviewing witnesses from different cultural backgrounds. The module's context could as easily have been structured for the Asian, Hispanic, or Black communities to help the police detective understand cultural differences when dealing with witnesses from different backgrounds.

Always on Instruction; Continuous Evaluation

CLEs represent an extremely powerful means of collecting rich sets of training data that are generated by the ongoing interaction of the student with the learning activities and their context. As information is captured and analyzed, we can enable content developers, instructors and students alike to gain insight into the implicit and tacit knowledge gained through each learning experience. However, in order for a CLE to be truly effective, a sound methodology must be developed for tracking the effectiveness of training at the student and, even more importantly, the organization level. In the 2nd mLearning scenario above, we would like to know how the Police department gauged the success of the sensitivity training module, can they correlate reduced complaints from minority groups directly to the training provided? Continuous and robust metrics begin with an understanding of constant quality improvement.

Constant Quality Improvement; The Performance-centric engine

"Much of the body of literature on quality improvement had its genesis in the manufacturing sector. It is only within the past 10 years or so that the benefits of quality improvement have begun to be realized in the healthcare, education, and service industries" (Hartman, 2002, p. xi). The fundamentals of quality are no less important than in the law enforcement organization and specifically in the area of human resource development or training.

Success in any organization "begins with the desire to achieve an ideal. An ideal represents a standard of perfection that one can strive for but never achieve—a fact that makes continuous improvement possible" (Clark, 1999, p. xvii). The difference or gap between the ideal and the actual is defined as variation. The reduction of variation is the critical element of quality (p. xvii).

Quality, as an ideal, is difficult to precisely identify and define, but as a broad organizational goal it can be simply stated as "doing the right things right" (Clark, p. 4). Clark (1999) explained that "doing things right" is efficient (doing your best), while "doing the right thing" is effective (knowing what to do), two mutually exclusive concepts (pp. 4-5). For example in law enforcement, the use of force continuum (escalating levels of force used) is taught in the training academies to prepare officers for use of deadly force situations in the field. What if the situation called for the use of "pepper spray" and the officer chose and used the pepper spray, but failed to activate the canister correctly. The officer did the right thing wrong. Drawing his weapon and killing the suspect would be an example of the reverse situation; doing the wrong thing right.

In the domain of educational or training quality, no single, consistent definition exists among training communities. In a doctoral research conducted by Mihal (see dissertation listed under former name "Sandra Powell Barber", 1990, Vanderbilt University, p.108) five general definitions of training quality were explored these included; judgment-oriented, measure-oriented, product-oriented, process-oriented, and student-oriented. Dr. Mihal correlated these training quality definitions directly with the type of institution and its particular mission. In a continuous learning environment (CLE), potentially all five types of definitions apply to the three functional areas of the training organization. In the training delivery function, emphasis is placed on measure-oriented and process-oriented definitions of training quality. Training support requires a student-oriented definition of quality to serve as the foundation of its evaluation. The Academy oversight function focuses on both the process and product-oriented definitions of training. Judgment-oriented definitions are the foundation of Kirkpatrick's evaluation levels III and Level IV.

As mentioned earlier, it is the transitioning or movement to the ideal of performance that generates the need for continuous learning environments. Therein, the emphasis is on learning and the combination of content, application, and context in a 3-Dimensional learning experience.

If as Clark (1999, pp. xvii-5) suggested, we "do the right things right" and if the ideal is a measurable standard of perfection then the creation of performance metrics (evaluation) are critical to the "effectiveness" and "efficiency" of the continuous learning environments, especially as technology and training moves toward the next generation of simulation-based learning.

Beyond theory; exploring CLE evaluations

In the Executive Summary for this whitepaper, we propose that the evaluation of the continuous learning environment poses a significant practical challenge. The questions we asked were; "How do we incorporate reliable, real-time metrics to measure continuous workforce improvement against the measurable goals outlined in an organization's mission-based learning strategy? What metrics can be used to tie training activities within the CLE to the overall performance of the organization?"

As we explore the underlying foundation for this paradigm shift in teaching and learning and implement first generation CLEs, there emerges an ever greater need for both robust quantitative and qualitative performance metrics and the technology to track them.

One initial solution to the evaluation of the continuous learning environment is the use formative and summative analysis, suggested Dick and Cary (1990), in the development and preparation of instructional programs. Using the basic Instructional Systems Design (ISD) model as a platform, in "formative" analysis information and data are collected during the initial stages of development through a series tools such as "one-on-one evaluation, small group evaluation, or a field trial" (p. 257). In "summative" evaluation, studies (survey-type instruments are created to collect data in an attempt to "verify the effectiveness of instructional materials with target learners" (p. 323). They provide the critical factual data that determines the success or failure of programs.

"Learning plays a major role in the development of competent, adaptable human beings. While some human strengths, abilities, and limitations are genetically determined, skills, knowledge, and reasoning abilities, as well as aspirations, attitudes, and values are generally recognized as being learned" (Gagne' & Medsker, 1996, p. 3). In law enforcement, police organizations recruit the best qualified candidates for positions within the department. "In the work environment, as elsewhere, little can be done to alter genetically determined traits, however, much can be done to help people learn and thereby change their behavior in ways that make them more competent and productive" (p. 3).

Gagne' & Medsker (1996) asserted that "learning is a relatively permanent change in human disposition or capability that is not ascribed simply to the process of growth" (p. 6). Training is therefore an important/significant responsibility of the law enforcement organization. To ingrain within the individual the necessary knowledge, skills, and attitudes to perform the job (learning activity). As mentioned earlier in the "Executive Summary", the continuous learning environment, the infrastructure, "will support the delivery of discrete, compact and re-purposable learning objects for whatever learning activity we need to access in order to perform a certain task or fulfill an immediate objective" (p. 1).

The instructional theory behind the CLE infrastructure is critical to the desired learning outcomes which, to be effective, must be derived directly from "mission-based learning strategy" of the law enforcement organization. Locatis (2001, p. 357) stated

that "instructional theories and models provide the guidance for designing [high-end eLearning/blended learning modules] multimedia programs that will achieve a range of learning outcomes" (cited in Medsker & Holdsworth, 2001). The described learning outcomes are then linked to the appropriate instructional theory. Key questions are asked to ascertain this linkage, such as "is the objective to obtain a certain knowledge or skill, to solve problems, to apply procedures or learn about oneself? Is it to motivate, to foster reflection, or to encourage individuals to learn together" (p. 359-360)? In addition, these questions determine the scope of evaluation that will be employed.

How do we incorporate reliable, real-time metrics to measure continuous workforce improvement?

Most experts would agree, that evaluation (assessment of program and personnel) is critical to the success of any organizational program such as the continuous learning environment. Given the "real time" nature of the new learning process, it is appropriate that evaluation and performance metrics be assessed continuously.

Using Kirkpatrick's model, Level I: Reaction and Level II: Learning are generally assessed during or immediately after the training program. These "satisfaction" based evaluations don't require the same time commitment or effort needed to evaluate Level III.

Level III (Behavior) is more difficult and complicated to measure because we must evaluate how knowledge, skills, and attitudes were transferred and taken back to the job. Was there a change in the job behavior of the participant because of the training programs? (Kirkpatrick, 1998, p. 48). Kirkpatrick offers three important considerations: first, the participant must have an opportunity to change once they return to the job; second, it is difficult to predict when the behavior will occur within the organization; and finally, will the participant like the behavior change or will internal/external factors cause the participant to return to old behavior (p. 48).

Kirkpatrick (1998) presents some very useful guidelines for evaluation at Level III, which can be utilized as performance metrics. They are:

1) Use a control group if practical.
2) Allow time for behavior change to take place.
3) Evaluate both before and after the program if practical.
4) Survey and/or interview one or more of the following: trainees, their immediate supervisor, their subordinates, and other who observe their behavior.
5) Get 100 percent response or a sampling.
6) Repeat the evaluation at appropriate times.
7) Consider costs versus benefits (p. 49).

Level IV (Results) evaluation is the most important, difficult, and challenging part of the evaluation process, but the evaluation was built (sequenced) on the proceeding three levels of evaluation. An important question surfaces (one always asked by management), what are the positive (negative) results to the organizations as a result

of the training program? These results will vary with the type of organization. Most questions, regardless of the organization, will center on productivity, quality improvement, turnover, costs and benefits to the organization.

Kirkpatrick (1998) presents some very useful guidelines for evaluation at Level IV, which can be utilized as performance metrics. They are:

1) Use a control group if practical.
2) Allow time for results to be achieved.
3) Measure both before and after the program if practical.
4) Repeat the measurement at appropriate times.
5) Consider costs versus benefits.
6) Be satisfied with evidence if proof is not possible (p. 61).

Measures of training effectiveness at the organizational level emanate from the measurable goals and objectives outlined in the organization's mission-based learning strategy. They include training and performance goals based on the required knowledge, skills, and abilities (KSAs) that law enforcement and military personnel must possess in order to perform their jobs.

To respond effectively to the challenges that CLE's pose, we must be willing to navigate uncharted waters by either exploring new levels of evaluation and assessment or extending existing ones.

One such level (Level V – Return on Investment) represents the pure economic impact of ROI on the organization. We also would argue that there is a qualitative factor to ROI that should be studied as well. Let's review Kirkpatrick's reasons for evaluation: "decide whether to continue or discontinue training programs" and "gain information on how to improve future training program." According to a whitepaper published by PrimeLearning, in a Level V – ROI Evaluation, we must assess the following factors:

1) Company
2) Number of employees trained
3) Original costs of training
4) Cost after the transition to a Blended Learning/Continuous Learning Environment
5) Total savings

PrimeLearning, in a 2001 white paper "eLearning: A Key Strategy for Maximizing Human Capital in the Knowledge Economy" indicated that "Workers today must constantly upgrade both their knowledge and skills if their companies are to continue to be successful. eLearning is a groundbreaking paradigm shift in the field of learning that provides high-speed access to knowledge and information" (p. 2). Their research can help draw inferences about future possibilities with continuing learning environments, performance metrics and simulation-based training. The PrimeLearning whitepaper identified several "key benefits of an eLearning solution:

1) Learning is a continuous, integrated part of work

2) Just-in-time access to knowledge/currency
3) Training can occur anywhere
4) Learning can be easily directed to targeted, supplemental resources
5) Learning is 'holistic' and blended
6) Instruction becomes learner-centric
7) Addresses the needs of all learner types" (p. 4)

The "key benefits" mentioned above are also embedded within the key advantages of continuous learning environment. With the eLearning infrastructure as a foundation, the benefits/advantages can be measured and evaluated with Kirkpatrick's model. Within the continuous learning environment, eLearning offers us many solutions to training needs such as "Addressing Learning Styles, Maintaining and Enhancing Skills, Compliance Training, and Return On Investment and Costs" (p. 6).

PrimeLearning believed that ROI and cost reduction were easily measured within the eLearning environment. Since training is major expense for any organization, it is critical that the investment be justified in "both quantitative and qualitative terms. A clear and well-documented ROI process helps determine:

- If training has impacted and taught the learners (reaction and learning)
- If learners have applied the learning back on the job (behavior)
- If there is any measurable business impact (performance change)" (p. 6).

Using Kirkpatrick's model, PrimeLearning surveyed six major companies with established eLearning investments for training their personnel. All six companies showed impressive savings in per student training costs over the traditional approach to training. PrimeLearning believed that the cost savings are there, but indicated that other factors need to be evaluated and that Kirkpatrick's Evaluation Model is very useful in the eLearning environment. The continuous learning environment can and should benefit from the PrimeLearning research.

Case Study (IBM's Management Development (MD) Organization – Mantyla, 2001)

In 1997, IBM's Management Development (MD) organization needed to expand its training capacity from "13,000 managers in the United States to training 30,000 worldwide, and it had to be done with fewer resources….marketplace changes were broadening managers' development needs, creating pressure to include more skill development in an already jam-packed five-day classroom program" (Mantyla, 2001, p. 31).

Mantyla, in collaboration with Nancy Lewis on the case study, prepared a case study entitled, "Creating a New Way of Learning for IBM Managers" that addressed the effectiveness of two dimensions within training: leadership and eLearning. These two dimensions were evaluated using the Kirkpatrick evaluation model. In the IBM case study, a "chain of impact" was used to sequence the evaluations "leading from direct training to higher-order business outcomes" (p. 44).

At the Kirkpatrick Level I (Reaction) evaluation, IBM utilized questionnaires and interviews to determine the participant satisfaction with the content and eLearning delivery within the program. The overall response was very favorable to the content and the eLearning format. At Level II (Learning) evaluation, the organization was interested in the overall acquisition of knowledge by management. Tests were given to assess level of comprehension by the managers in training. Another goal of the testing was to ascertain if knowledge acquisition was greater to or equal to the classroom-only program. The results indicated that knowledge learned was at least equal to, if not greater than the traditional classroom approach (pp. 44-45).

As was mentioned earlier in discussions regarding the Kirkpatrick model, Levels 1 and 2 are generally easier to assess. In reality, these two levels are critical to the overall evaluation sequence. In Level III (Behavior) evaluation, IBM assessed the graduates of the eLearning program six-months after completion in an attempt to measure (actual and observation) behavior change within the organization. Results indicated that the managers showed significant changes in behavior and especially, in the area of self-efficacy (American Heritage Dictionary: "Power or capacity to produce the desired effect; ability to achieve results; effectiveness"). Within the organization, these trained managers were able to achieve positive economic business outcomes (pp. 45-47).

In Level IV (Results), IBM, as suggested by Kirkpatrick, measured the business (ROI) results as in Level III (Behavior) with measurable improvements in leadership and business impact. Statistical evaluations (similar to measurements used in Statistical Quality Control) framed around 11 behavior indexes (variables) and correlated with measures of business impact. The study indicated that significant relationships existed between the behavior indexes and positive business impact (pp. 47-50).

Mantyla's case study indicated the need for a Level 5 (ROI) evaluation. The case was easily made for cost efficiency in comparing the eLearning approach to the traditional 5-day classroom training program. The cost analysis reflected a reduction in costs per student (13,000 versus 30,000 world-wide) using the eLearning approach. IBM was able to project similar possible cost savings if the eLearning format was applied to the over 307,000 company employees (pp. 47-53).

By using IBM's "chain of impact" approach in the eLearning environment, there was a "cost avoidance (savings) and a results enhancement. The Return on Investment (ROI) was "based on the actual cost of creating and deploying a module and the tangible cost benefits based on the usage over an 18-month period" (p. 49).

In addition, it was determined that the function of "re-usability" of the technology and content would increase the ROI over the successive periods of delivery. Of course, there will always be update/improvement cost associated with the eLearning program.

Mantyla (2001) provided additional insight contributed by Conceicáo-Runlee and Glowacki-Dudka (1999), which supports the Kirkpatrick model concepts. "Evaluation is an important aspect of any training program because it justifies the existence of training and documents the effectiveness of the training content for the learner,

facilities, and the learning technology" (p. 131). Evaluation needs to occur (pretest/needs assessment) in the pre-planning, during the actual training, and after the completion of the training program. Again Dick and Cary's (1990) description of formative and summative evaluation make sense in the continuous learning environment. Conceicáo-Runlee and Glowacki-Dudka (1999) offered the following strategies for consideration in evaluations: (pp. 133-135)

1) Cost-benefit analysis
2) Direct observation
3) Instructor preview
4) Learner tryout
5) Logs
6) Open-ended experience
7) Peer review
8) Questionnaire, survey
9) Product reviews
10) Reflection
11) Talking with the learners
12) Technology statistics/performance
13) Training observation

Numbers (quantitative assessment) are often used to address the effectiveness or efficiency of any action (police activity) or process (rules and procedures). Counts and measures are used to quantify the assessment. A common tool, a Statistical Process Control (SPC) chart, is often used to demonstrate the success or failure of an action or process. SPCs are identified as follows:

- Flowchart – often called a "process chart"
- Run Chart – referred to as a "trend chart"
- Histogram
- Cause-and-Effect Diagrams
- Pareto Charts
- Scatter Diagrams
- Control Charts

These tools can be used to measure the actions or processes within an organization. These tools also assist in the evaluation component of the PDSA Cycle (Plan-Do-Study [Check]-Act) which was developed by Walter A. Shewhart in the early 1920s and made functional by W. Edwards Deming in the Quality Improvement process. The PDSA Cycle has been modified in recent years to reflect a variety of evaluation and assessment models and processes.

Higher Calling; The capstone of the performance-centric organization

Experts and professionals in the field of training evaluation have often looked to extend the Kirkpatrick Model beyond the four (Reaction, Learning, Behavior, and Results) basic levels in an attempt to find new metrics for assessing human

performance. As discussed in the Executive Summary, the emergence of the 'performance-centric' economy will require new approaches to organizational evaluation. Because the emphasis on performance will not only require a perfect balance between skills and knowledge, but, will additionally focus these attributes upon the fulfillment of a specific mission or higher purpose, the next generation of performance metrics may require training evaluation to ascribe new meanings to measurable items.

Chapnick (2001), like other professionals, believed Kirkpatrick's "four levels of evaluation were comprehensive; he pretty much had it covered. To paraphrase his [Kirkpatrick's] model:

- Level 1: Trainee perception. Was the participant happy with it?
- Level 1: Trainee Simulated Performance. Can he or she demonstrate acceptable competency in a simulated or artificial environment?
- Level 3: Trainee Second Nature. Have trainees integrated the instructional content into their everyday work?
- Level 4: Organizational Improvement. Is the company doing better than before the training" (p. 79)?

As mentioned earlier in this paper, motivation is a key factor in the learning process. Chapnick, in dialogue with another colleague, took a more pragmatic approach to human motivation in the workplace, in learning situations, and in seeking the training (p. 79). She concluded "that no evaluation model, including Kirkpatrick's , has captured the driving force responsible for more learning retention than all the compensation plans combined: a higher calling" (p. 80).

A "higher calling" is certainly a factor worth measuring in the law enforcement, military and emergency first responder communities. There is probably no better example of the "higher calling" then the heroic actions of law enforcement, firefighters, and emergency medical personnel who entered the World Trade Center Buildings after the terrorist attacks on September 11, 1991 in an attempt to save the lives of citizens who worked in those buildings. Even more recent examples are the heroic sacrifices made during military action in the countries of Afghanistan and Iraq. What motivates these men and women to excel in their chosen profession and how do we measure it?

Chapnick (2001) suggested that "there needs to be another level, a Level 5, and there are two ways to approach it. The first is motivational and directly affects participants. The other is evaluative" (p. 80). She recommends that trainers take the time to observe and listen to the students in an attempt to determine the "real" reason for participation in the learning environment. Chapnick questions "how much time, money, and effort are sunk into misguided incentive plans that backfire, never work in the first place, or are ignored" (p. 80). In a continuous learning environment, it will be essential and critical to both the effectiveness and relevancy of the environment to incorporate these metrics in the evaluation of performance.

The second factor in the Level 5 (Higher Calling) is evaluation of the direct impacts to the stakeholders (the department, the community, and the citizens) and those who fund the services. In effect, this evaluation goes beyond the ROI evaluation. It addresses the participant's impact on the organization and on society, but from a larger and more holistic perspective. The better question may be, has the participant improved the organization or society and has the learning environment contributed to the process.

Chapnick offered that it is not easy to evaluate at the Level 5, "to measure what is not easily measurable", but she sees a real advantage to those involved with training evaluation willing to make the effort to observe and listen and search for the "higher calling" (p. 80).

In the continuous learning environment, some metrics that law enforcement agencies could measure are the following:

- Internal customers (peers, supervisors, mid-level and executive management)
- External customers (the community at large, the citizen, other departments and resources
- Public safety and emergency first responders
- Crime statistics
- Community involvement by members of the law enforcement department/agency

The above-described metrics are certainly not all inclusive because each department or agency needs to assess the issues that impact their respective organization. In many of these situations, the metrics are quantitatively measured and police executives are forced to make decisions based solely on the numbers. As Chapman suggested, a Level 5 – Higher Calling evaluation presents the opportunity to qualitatively assess the metrics.

For example, let's take a medium-sized community that has a poor image of their police department and the department seems unable to change the community perception. How does the organization change the community perception? Using an in-depth interview approach, an assessment of the internal and external customer might prove beneficial. The internal customer is the police officer. How does he/she feel about the community? Is it a "Us versus Them" mentality? What are the underlying causes for this mentality? Through extensive interviews of all levels in the organization, hopefully a problem definition will emerge.

Now, let's look at the external customer, the citizen in the community. Why do they have a perception problem with the police? Is it a product of some event or pattern of events? Why have they lost confidence? Through similar intensive interviews and contact with the community, a useful picture of community unrest should develop. Only with this type of data (qualitative and quantitative) can training professionals approach the Level V evaluation.

Conclusion

The 21st century is yet unfolding and the uncertainty of the next generation is daunting, but continuous learning environments are emerging as a critical bridge between organizational needs and performance. The CLE may offer the most effective and efficient way to train and support the next generation of performance-centric learners provided, that we forge solutions that enable us to track the performance of the learning infrastructure, content and instructional methodology against measurable organizational goals and objectives. The inclusion of a "higher calling" tracking mechanism is a key that should enable us to significantly enhance the impact of our learning environments and provide rich insights into what drives performance.

Law Enforcement and Military training professionals more than any other group, are at the forefront of training innovation. For them, training is about more than operational performance or enhancing revenue, training saves lives both of personnel as well as civilians. A "higher calling" is directly related to the performance of these communities, in the future, the CLE may be a critical element of not only measuring performance but of reinforcing the higher calling that is at the root of successful law enforcement and military organizations.

We would like to dedicate this research to all of the men and women who risk their lives daily to guard our freedoms and keep and our country safe.

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In January 2003, after a 25-year career as a Special Agent, Mr. Christenberry retired from the Federal Bureau of Investigation (FBI). During his career, he served in the Minneapolis and New York Divisions of the FBI before being transferred to the Training Division as an instructor in the New Agent and the FBI National Academy Training Programs. In 1995, Mr. Christenberry became the Program Manager, for the FBI's Satellite and Distance Learning Training Initiative, as well as Executive Producer and Host for the "Viewpoints from the FBI Academy" and "Law Enforcement Live" satellite training programs.

In 1998, Mr. Christenberry became the Chief of the Multi-Media Unit, which was responsible the FBI's eLearning Program distributed through the FBI's Virtual Academy and Distributed Learning Programs for the FBI and Law Enforcement personnel.

Mr. Christenberry has instructional expertise in a variety of areas to include: Executive/Crisis Media Relations, Instructor Development and Use of Technology, Adult Education, Learning, Theory, and Practice, eLearning and the Blended Learning Approach to traditional and electronically mediated education and training.

Mr. Christenberry is currently an adjunct instructor for the School of Adult Learning, University of Indianapolis, consulting with several high-tech companies specializing in the development of eLearning tools and methodologies, as well as consulting with various federal, state, and local law enforcement agencies.

Mr. Christenberry holds an M.S. in Educational Administration from Butler University and a M.S. in Adult Learning and Human Resource Development (ALHRD) from Virginia Tech. In addition, he is completing a Ph.D. in ALHRD from Virginia Tech.

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Sonny has over a decade of experience developing Internet-based learning environments and information management tools. He has published and presented extensively in the fields of human-computer interaction, adventure learning, problem-based learning, and utilizing new technologies in various learning settings, including mobile mixed reality. Kirkley holds a M.S and Ph.D. in Instructional Systems Technology from Indiana University. He has presented extensively on innovative and mixed reality learning environments, and designing learner-centered software.

Dr. Kirkley is also founder of the WorldBoard Forum, a university-based research group developing WorldBoard. WorldBoard seeks to develop a global infrastructure for the deployment of mobile augmented reality. As vice president of product development and co-founder of WisdomTools, he was the co-inventor, and managed the development of Time-Revealed Scenarios, a Web-based learning tool employing case studies.

Before embarking on the WisdomTools venture, Dr. Kirkley was Assistant Director of Research and Development at the Center for Excellence in Education at Indiana University. There, he managed various teams of staff and consultants in the development of Web sites and computer-based tools for educators. These included online tools for electronic field trips, developed in collaboration with Turner Educational Services—the educational arm of CNN. Other tools delivered training to hundreds of educators, corporate trainers, and university faculty about methodologies for integrating information technologies into their organizations.

Prior to his work in learning technologies, Dr. Kirkley worked as a political campaign manager, a stock broker, and desktop publisher. His military experience includes four years in the U. S. Army Reserves and during undergraduate school was in the Army ROTC program.

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Dr. Sandy Mihal is an expert in training techniques, instructional design and curriculum development, adult learning styles, and computer information systems.

Dr. Mihal, served as the Distance Learning Specialist and Project Manager with the U.S. Immigration and Naturalization Service where she was nominated for the prestigious Department of Justice Justworks award (Vice-President's Hammer award) for her groundbreaking technical design of a Mass Immigration Emergency Plan training project.

Dr. Mihal possesses over twenty-five years experience in course development, curriculum design, and instruction and computer systems analysis. She led the development and implementation of the first Associates Degree in Computer Network Management in the United States. In the academic community, Dr. Mihal served as a tenured professor, department chair and division chair at universities and colleges.

Holding a Bachelor's Degree, two Master's Degrees, and a Doctorate from Vanderbilt where she graduated with highest distinction, Dr. Mihal is extensively published with two instructional technology textbooks, twelve journal articles and twenty-eight professional papers. Her doctoral dissertation entitled "An Examination of Accreditation: Views Held By the Key Participants is widely used as a benchmark for accreditation standards within the Federal Academy and Higher Education environments." And she has been called upon by numerous institutions including the University of Southern Indiana, University of Kentucky, the Middle States Association, The American Council on Education and the U.S. Army to evaluate and review their accreditation standards.

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In his 15 year career in high-technology, Mr. Vidali has been the lead founder and visionary for 5 high-tech enterprises. Over the last 5 years, in his capacity as founder and chairman of ENVISAGE Technologies Corp., he has been instrumental in assisting Federal Law Enforcement Academies with automation strategies, and pioneered one of the leading enterprise architectures focused primarily on law enforcement training applications. Mr. Vidali is currently working with several of the Nation's largest Law Enforcement Academies to deploy state-of-the-art Academy Administration, Workflow Management, Enterprise Scheduling and Learning Management Systems.

In addition, he is at the forefront of developments in eLearning tools and methodologies and worked closely with a top 10 University to develop and deploy a eUniversity strategy supported by an enterprise-class LMS (learning management solution) targeted at Fortune 100 companies. His current work involves researching uses of artificial intelligence for adaptive learning environments, repurposable learning objects and immersive e-learning simulations.

Mr. Vidali has consulted for the Federal Government, Law Enforcement, Higher Education, Medical, Financial, and Real Estate industries.

As a nationally recognized, visionary and frequent speaker and writer on the subjects of technology as an education enabler, online transaction management, reinventing business on the Internet, data standards and Law Enforcement Academy Automation, he has been featured in publications such as the Wall Street Journal, Chicago Sun Times, Realtor Magazine, RIS Media, and PC Week.

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