PHILiS – Public Health Interactive Learning System

EXECUTIVE SUMMARY

The goal of this project is to create an interactive, modular, case-based learning content management system that effectively mimics a full-range of real-life health care and public health emergency situations for an immersive learning experience.

Expanding upon the traditional case-based training model, PHILiS will challenge learners to respond to simulated public health emergencies through telephonic, email and web-based interactions in self-paced and real-time modes. Each interaction will allow the learner to select appropriate choices, seek additional information or obtain just-in-time didactic content. The system will allow the learner to assume different roles, play at varied levels of complexity and achieve specified goals in a self-contained e-learning activity.

PHILiS will track the learner's ability to meet basic and advanced learning objectives, while automatically generating an individualized needs assessment. A comprehensive logging regimen will facilitate the enhancement and development of other continuing education programs targeted at the same population.

PHILiS will employ an evidence and outcomes-based learner-driven model and will be built with current industry-standard open source software and hardware.

The one-year pilot phase will result in the development of a scenario for use by nurses, health department staff and emergency physicians.

Key deliverables will include:

1. Establish the development team and expert panel.
2. Develop the e-learning engine and schema for core modules needed to support the pilot.
3. Adapt an existing tabletop exercise to the PHILiS format.
4. Establish functional parameters through key-informant interviews and focus groups.
5. Create a proof-of-concept system for pilot testing.

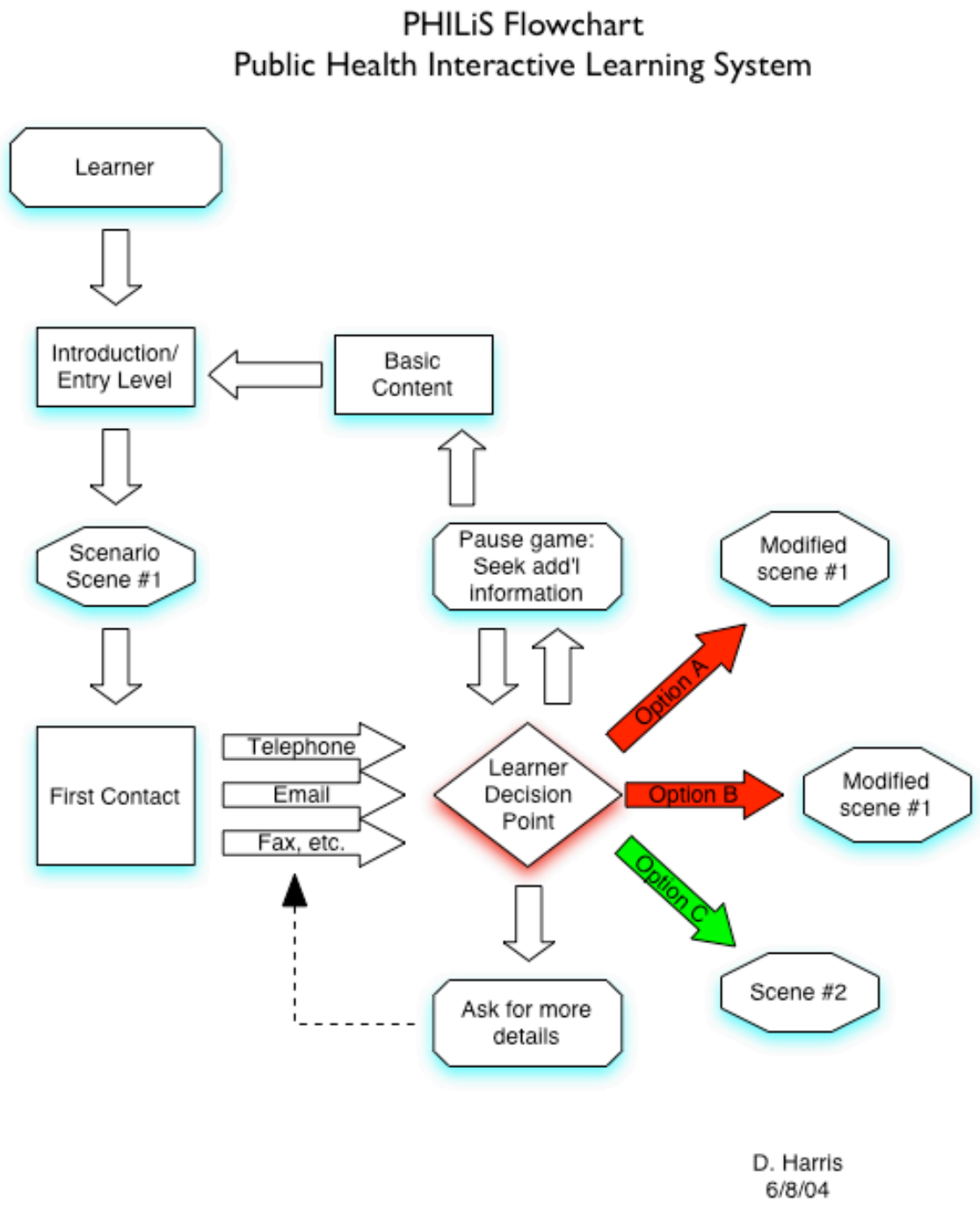
PHILiS Flowchart
Public Health Interactive Learning System
Learner
Introduction/ Entry Level
Basic Content
Scenario Scene #1
Pause game: Seek add'l information
Modified scene #1
First Contact
Telephone
Email
Fax, etc.
Learner Decision Point
Option A
Option B
Option C
Modified scene #1
Scene #2
Ask for more details
D. Harris
6/8/04

Figure 1

HOW PHILiS WORKS

Robust case studies are the core of PHILiS. For example, a scenario entitled *the life cycle of a biological terrorist incident* will be overlayed on a technical framework employing a nodal/tree structure. The first (entry) level will primarily be constant and lead the learners through the setup and basic learning objectives. During this setup phase, learners will choose a *perspective,* such as nurse, infection control practitioner, health officer, epidemiologist, etc. A perspective will have multiple avenues of pursuit and several will be *right* paths and several will be *wrong* paths (assuming a real-world situation where *absolute* right and wrong does not exist).

The simulation of a real-world incident begins at the scenario level. Successful navigation through one level will advance the user to the next level. If a user does not advance, he/she will be presented with slightly different parameters in the same level in an attempt to engage the user to apply knowledge learned from the prior failure. The learner's success or failure to progress through the activity will be evaluated.

How a user responds to a given situation will be analyzed and the end result will inform the activity director of the improvement, if any, that a learner has made with respect to the given topic.

At each level, learners have the opportunity to hyperlink to material external to the simulation to help them successfully promote to the next level. These detours could be customized to meet the training targets of the learner established at the outset or identified during game play. Analysis of this information will provide the system managers with a clear picture of the learner's needs. The learner is essentially providing his/her needs assessment during the activity.

Critical to the PHILiS' e-learning platform is a multi-functional communication interface that pushes content to the learner through telephone calls, text message, email, fax and receives responses through touch-tone pad and website input. Thus, PHILiS will be able to mimic some of the imperfect communication issues that arise during any emergency. Learner participation in a PHILiS-based exercise is not limited to time when a computer is available. In a real-time mode, PHILiS will contact learners wherever they are and whenever they are available. This level of engagement also mimics the inconvenience that often comes with emergencies.

PHILIS will employ a modular design to allow for additional functionality as technology advances. For instance, the Communicable Disease Reporting System (CDRS) interface could be incorporated into the PHILiS platform allowing learners to practice the entry and review of epidemiologic data in the midst of the scenario. The learner's use of this important system will be logged for later review. Other add-on modules candidates include electronic medical record systems, Epi Info, plume modeling systems, etc. Learners can even be directed to call standardized contacts to conduct mock interviews. These interactions will be evaluated using methodology similar to the Objective Structured Clinical Examination (OSCE) employed by medical schools throughout the world.

GOAL OF ACTIVITY

This exercise is significant because it addresses key problems that have existed in traditional continuing education activities. The case-based nature of the activity satisfies the health profession's need for **evidence-based content**. How to measure **outcomes/improvement** without access to patient charts or other records is often an issue. Advancement through this activity implicitly details a user's improvement in a given subject matter and does indicate the learner's improvement level.

True *needs assessments* are difficult to obtain. Although the activity begins with a generic educational program that meets basic learning objectives, the tracking of learner's requests for information during the activity tells us what the learner needed to know in order to improve and successfully complete the activity. *Content validation* is provided by the learner's continued participation and success validates the relevance and importance of the content.

THEORY

Humans tend to restructure knowledge as an adaptive response to situations. Understanding is constructed by using prior knowledge that goes beyond the information provided, and the prior knowledge is itself accessed in a constructed manner (from memory).

This is essentially an adaptation of the typical constructivist learning theory. The basic components of constructivist theory are:

Learning is constructed – from experience that one builds on
Interpretation is personal – our realities are individual not universal
Learning is active – learner must be an active participant in the activity
Learning is collaborative
Learning is situated – real world situations are necessary and relevant to the context in which the information will be used (case-based studies)
Testing is integrated – not a separate entity

The Cognitive Flexibility Theory (CFT) has the following major principles:

Avoid oversimplification in the learning process when dealing with advanced knowledge domains
Provide multiple representations of the learning content
Offer multiple examples and cases with multiple perspectives of the content
Use real-world context applied in dynamic situations
Construct knowledge instead of transmitting – encourage transfer by allowing learners to develop their own knowledge
Support complexity – multiple representations of the same information and different thematic perspectives on the same information

The way learners are taught informs the type of cognitive structures they create, the way they store and structure learned content, and how flexible they will be when they use the knowledge of the content. Content must be provided multiple times with multiple purposes. The learner "learns" many examples of the uses of specific content. The learner incorporates knowledge from several conceptual and case perspectives. The knowledge can then be constructed from these perspectives and tailored to the needs of a specific problem at hand.

The computer (web) is an excellent medium for implementation of flexible instructional activities. The variability needed for ill-structured knowledge (content that is circuitous and/or open to interpretation) is better suited to the internet than to traditional instruction. The internet affords the learner the opportunity to approach the material in a *random access* manner, which provides a more flexible approach. Thus, the learner accesses the material in a way that is meaningful to his/her learning needs.

PHILiS' flexible methodology provides complementary needs assessment. The learner is providing the teacher with the necessary assessment as they tunnel through the activity.

APPLICATIONS IN CONTINUING EDUCATION

PHILiS will provide a *true needs assessment,* distinguishing it from other e-learning models. The learner is presented with a base level of educational material that is constant and non-variable. This material would essentially qualify as *learning objectives*. Learning objectives in this context are teacher driven. The teacher is determining a base level of knowledge in which the learner must be proficient.

The next level of learning is the CFT-based activity (cognitive flexibility theory), discussed earlier. The learner is presented with a case study (or several parallel studies) that have multiple solutions and the ability to link out of these case studies to the appropriate baseline material. The learner will be taken into *real-world* simulations and will walk through a computer-generated case with a perspective of their choosing.

The learner actually chooses which aspect of the activity they need to learn. They have the ability to drill back (or in some instances skip forward) at any time. The assessment of the leaner, the learner's education needs, and the activity itself is constant and individuated throughout the activity.

TECHNOLOGY

The technical backbone of this system allows for repurposing of all content. The perspective nodes are essentially plug-ins – perspective plug-ins that allows one to make significant changes without redesigning the essential structure. Perspective plug-ins can be added or removed at any time with minimal effort. The only requirement will be that the perspective plug-in fits in with the overall case study that is loosely defined at the initial level. The perspective plug-ins can be used in other case studies. New case studies are generated by creating a loose base level case

study with as many perspective plug-ins as needed. The ability to repurpose existing content modules is the ultimate goal of learning content management systems.

A structure that allows an activity directory to seamlessly create content is essential to building easily adopted e-learning content management systems. The Return on Investment (ROI) and the Return on Education Investment (ROEI) is significant.

The system will employ education standards for learning module construction – SCORM (a widely accepted set of standards for designing e-learning programs for the sake of compatibility.) SCORM compliance will provide us with the ability to easily collaborate with other learning entities. We will also use SCORM medical extensions – the MedBiqiutous standard – an additional layer of data that accommodates medical learning.

BUDGET - PILOT PHASE (approximate - subject to verification)

Staff: Programmers Curriculum Developers Administration	$85,000
Equipment: Server for Fax/AutoDialer/SMS Messages/E-mail broadcasts & Computer simulation System:	$10,000
Other: Focus Group Beta-Testers	$8,000