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**Using Emerging Technologies in Online Course Delivery:
A Course Showcase and Lessons Learned**

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ABSTRACT

In response to the growing demand for flexible educational programming, the Marine Institute of Memorial University of Newfoundland has developed a number of post-secondary courses from our degree, diploma, and professional certification programmes for online delivery. The Internet, communications tools, learning technologies, and course specific CD-ROMs are integrated into courses where they are best suited in terms of instructional design. The audience for these courses has included full time, part time, in-house and virtual adult learners.

This paper will illustrate how the Marine Institute is adapting to the changing landscape of education with its efforts for providing alternate educational options to accommodate the schedules and circumstances of our clientele. In particular we will showcase both the instructional design and developmental process, and final delivery of a fully online course for offshore fishers entitled *Navigation and Stability*. A description of the uses of the new technologies employed in our course design will be explained and discussed. Experiences and lessons learned concerning asynchronous and real-time features of technologies will be addressed. Logistical and technical considerations will also be noted along with an opportunity to view the components of the course. To conclude, the changing demand for learning opportunities and the enhancement of post-secondary maritime education will be discussed.

1. Introduction

Traditionally, seafarers returned from sea time to spend time with family, leisure and other interests before returning to sea for a duration of time that could last from 3 weeks to 6 months depending on the company and/or their position on the vessel. When advancement or upgrading in a certificate was necessary, mariners would be required to set up residence in the location of the Marine Institute from rural areas or other provinces. As training became more frequent due to progress in systems, regulations and retiring personnel, advancements in educational

technologies were noted, with the possibilities for companies and individual students. Inquiries about taking advantage of educational opportunities using technology for their own gain were being made to Marine Institute. It would decrease training costs for both individual and company, and allow for less time away from work, and more time on land for family and other interests.

As the knowledge economy took root, diploma graduates from 3-year technical college programmes were looking to advance into degree programmes. The online Bachelor of Technology degree programme was developed in response to this demand and it is now marketed internationally. The online Bachelor of Maritime Studies and Master of Marine Studies programmes have since followed.

At the [Marine Institute of Memorial University of Newfoundland \(MI\)](#), the delivery of online distance education programmes is a relatively new initiative, since 1998. In 1995, a learning technologies team was formed to develop educational products with a view to distance education. Several CD-ROM products were developed between 1995-1998, without a standardized systematic approach for the development of technology projects. In September 1998, MI started to formalize the planning processes and procedures used in the development of technology projects regarding project management, instructional design, development and delivery. Eventually, logistics were devised and implemented that attempted to push delivery into the mainstream of programme delivery, and processes and procedures were documented and implemented for course design, development and delivery.

One of our particular strategies, the Bachelor of Maritime Studies (BMS) programme, has been steadily growing in the international Maritime community with respect to both reputation and student interest. It is Canada's only degree programme in maritime studies approved by Transport Canada (TC) as meeting or exceeding STCW standards. There are thirteen required courses including a project and a report, all of which can be fully completed via distance.

The programme accepts a range of graduates from disciplines such as nautical science, marine engineering, naval architecture, and marine systems design. The overall goal is to add an academic component to their existing technical education while exposing them to contemporary organizational and human resource management ideas, and to provide insight into economics and social sciences in the global context. The target clientele is mariners who have the desire for further education but cannot commit to the inflexibility of the traditional classroom. Furthermore, the ability to learn using the internet has made this programme such a success in the international maritime community that enrolment has doubled since September 2002.

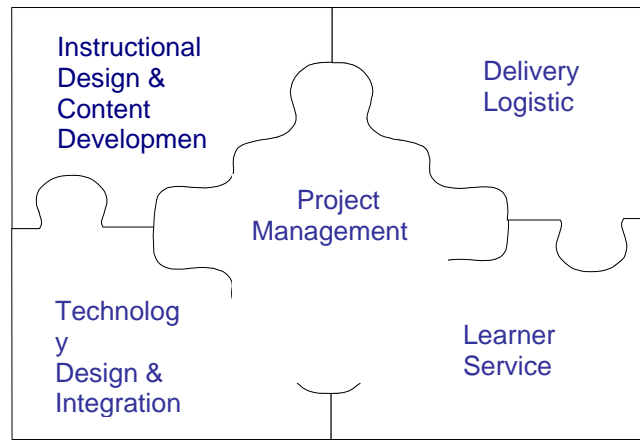
The next section will highlight the approach that Marine Institute presently employs for its courses and projects. The systematic process ensures that institute-wide planning processes and procedures are integrated to result in quality educational products and services for Marine Institute students. As well an individual course, *Navigation & Stability*, which is scheduled for pilot delivery this September, will be analyzed in terms of its chosen elements and the logic behind the instructional design selections.

2. Instructional Design Processes and Procedures

2.1 The Team

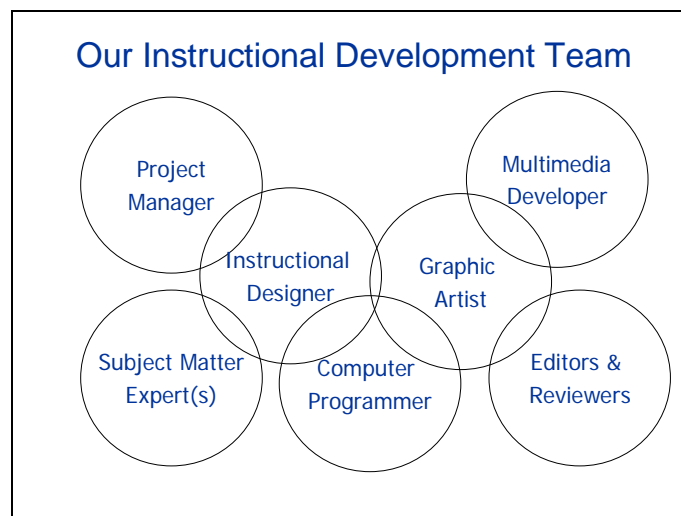
A team-based approach to projects for designing, developing and delivering online programmes is used at Marine Institute. The significant pieces of the puzzle are seen to be these that Figure 1 illustrates: project management, instructional design and content development, technology design and integration of content, delivery logistics and learner services.

Figure 1. The integrated themes necessary for successful online learning.



The members of the team are identified and their roles defined. The team consists of a project manager, subject matter expert(s), an instructional designer/project manager, a graphic artist, a multimedia developer(s), a computer programmer and an editor(s) (Figure 2). The project utilizes resources of each member, where appropriate, for areas such as content, administration, technical, processing and layout. Some of the team members may have dual roles.

Figure 2. The team composition for design and development.



2.2 Project Management

The instructional designer/project manager begins the development process by working with the creative design team (internal or external) to produce a design template.

The team then produces a prototype that represents a fully functional subset of the project. The prototype is reviewed and revised by the team as well as other personnel, as necessary. Required changes are incorporated into the prototype and the remaining modules are produced. The final draft is presented initially to internal auditors and subsequently to external examiners. Edits resulting from these reviews are incorporated into the project. At this point an instructional designers report is generated and distributed to the team members to provide the initial focus (see Appendix A).

2.3 Tasks

Prior to the first planning meeting, a project task analysis, time line and role responsibility is charted by the project leader. The team works toward its goals by using a continuous quality improvement tool such as the Plan, Do, Check, and Act (P-D-C-A) Cycle as described by Brassard and Ritter, 1994 (p. 115). **PLAN** what you want to accomplish over a period of time and what you need to do to get there. **DO** what you planned on doing. Start on a small scale! **CHECK** the results of what you did to see if the objective was achieved. **ACT** on the information. If the cycle is successful, standardize the plan, otherwise continue in the cycle to plan for further improvement. This is a problem-solving process that is integrated in the individual work of team members and in the overall effort of the project.

A chart is used to track progress and offers a time line for the tasks, duties and deadlines for each role. The chart provides a view of role relationships and interdependence and provides a plan of action for each member. For tasks that require more than one team member, scheduling is negotiated by those involved in the tasks in accordance with the overall schedule. Progress meetings are established and a distribution list is used for group communication.

During the initial meeting the project scope is defined in relation to the needs assessment. The process for the project is presented. Tasks are presented to the group; input is invited and the tasks are revised, if necessary. The time line is presented in relation to tasks; input is invited and the time line is revised accordingly. The schedule and format for progress meetings is set, and dates for full team meetings and sign-off deadlines are determined. The format of progress meetings generally includes:

- preparation for meeting;
- agenda circulation;
- an update of activities to team members;
- highlights of issues for action;
- problem solving and troubleshooting;
- proceedings documentation and distribution.

2.3 Development

The instructional designer and the subject matter expert work closely to establish a design and a learning strategy for the content. The learning technology and media choices are carefully planned. Course management tools and learner tools are identified to fit the design of the course. The instructional designer then produces storyboards and a media matrix outlining the media requirements. For the purpose of this paper, the attributes or the work associated with each have been separated even though the design and development are integrated or non-linear.

Today's educational philosophy focuses on the students as active learners. The lessons should help them build on previous knowledge (the theory of constructivism), use authentic examples and encourage collaboration and interactivity to master the course material.

An opportunity for learning in each phase of the cycle should occur in the presentation of the content. The learning domain most applicable to the subject matter is determined, whether it is the affective domain, psychomotor or the cognitive domain. Each domain has various levels of objectives and a collection of associated verbs. The different styles of learning and opportunities for learning preferred by each style are considered as espoused by Kolb's theory of learning styles (Hartman, 1995).

Learning theories that the team members might advocate influence much of the development and design. A bent toward collaborative and constructivist teaching and learning models is emerging, nonetheless an eclectic approach is, generally, applied. Selected media and tools are used to endorse an interactive instructional and graphic design with authentic examples and exercises. Mechanisms for student practices and feedback are provided throughout the course and at the end an overall course feedback survey is administered. Navigation is given attention and lifestyle and flexibility issues are considered and appropriately addressed in the design.

Learning objectives for the course and each section are developed and outlined. Learning paths or guideposts that help students navigate through the course in chunks and on time are made available. Texts and reference materials are identified, accessible and associated with respective parts of the course. Recommended and required readings are delineated. A variety of individual and or group assignments, tests and activities and answer keys are produced. Copyright authorization is sought for any sources that do not fall under the CANCOPY agreement, Canada's copyright authority. A copyright officer is available to assist with obtaining copyright and a log form is used to track the authorization contract. To guide this development process the instructional designer follows the essential elements outlined in Appendix B.

3.0 Course Showcase

3.1 The Project Background

The Marine Institute of Memorial University of Newfoundland (MI) and The Irish Sea Fisheries Board (BIM) have partnered to design and develop a fully contained online course called Navigation and Stability for small boat fishers. There will be a set date for the students to start

and complete the course, the students will move through the password-protected course as a group, and the course would be facilitated by an instructor.

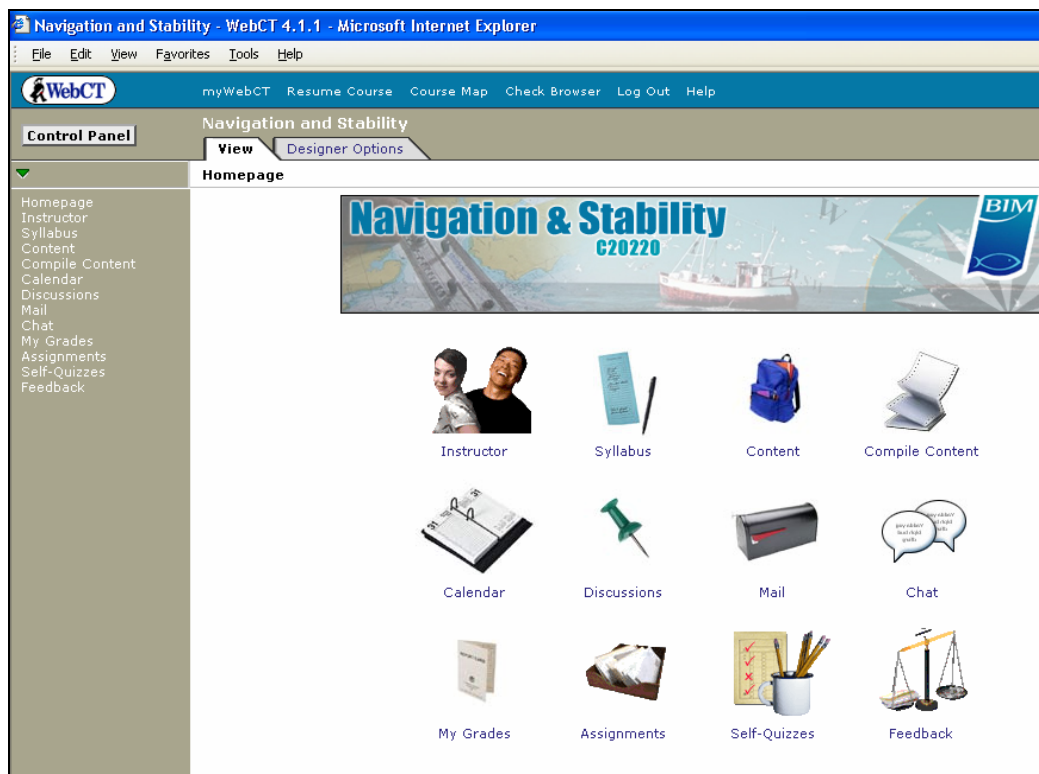
To enter this site as a student, go to <http://webct1.lyit.ie> and enter the following information:
Username : Bim.Guest Password : iascaigh

The strategy is to have the final e-learning product made accessible by entering the learning technology login page. The learner will be directed to this entry page where they will be asked to enter a username and password which they would have received previously via email when they registered for the course. This password protected site, managed by Letterkilly University, would accommodate the completed course. The course would be developed and reside inside of WebCT version 4.0, a learning management system. This software allows for various levels of permission such as administrator, teacher, and student. The administrator and teacher would both be able to track students progress, review the chat logs, view all incoming and outgoing messages, assign and view all student grades, and modify course content or settings as desired.

3.2 Course Elements and Justification

In the case of the *Navigation and Stability* course for onshore fishers, course information will be presented to the learner through approximately ten different icons or zones, as figure 3 illustrates:

Figure 3. The Navigation and Stability WebCT course front page.



The students would have a variety of communication tools at their disposal such as a bulletin board divided into corresponding chapter areas; private email inside of WebCT where they could email either their teacher or other students – not outside addresses; and synchronous chat rooms in which electronic logs are kept for the teacher if need be. The goal of these elements would be to decrease the isolation and intimidation many students experience during online courses. Steven Tello (as cited Lorenzetti, 2004) comments, “This research and conversations with students and faculty suggest that the more interactions the better. As an administrator of a fairly large online programme [7500 student enrolments in 2004 academic year], I never have received a student complaint which states there was too much communication.” Students expect interaction to occur in distance education with the advancements in technologies. They see this as supporting the development of a community of inquiry and critical thinking skills.

The most important zone, the “content” icon, would contain the bulk of the course notes and offer features such as the ability to compile the online notes for printing purposes and to search for key words. Some teachers use this area to post course notes, as they traditionally would on the chalkboard to supplement the notes from the textbook. Others work with the instructional designer and multimedia team to create self-contained, course notes complete with various integrated media such as images, streaming audio, video and animations.

The “syllabus” icon would contain the overall learning objectives of the course, course details and the evaluation scheme. This serves to keep the students on track and keep them aware of the scope of information they are responsible to learn. The “calendar” icon would serve as a learning guide to help the students both budget their time and view at a glance what would be required of them and corresponding deadlines. We had initially devalued the importance of this element but the course feedback forms made us realize that the students felt more in control and were more academically successful with detailed learning guides. Shotsberger (1997) advises that learners should be given the opportunity to interact, to reflect, and to apply their learning experientially, but it is unreasonable to expect these kinds of outcomes without clear guidance.

Depending on the course and the preference of the teacher, the assessment could be integrated into the course content as links to self tests, exercises, assignments or tests as applicable and would also be compiled and available under the “assessment” icon. The students would receive instant feedback from any WebCT designed self-tests and a “my grades” icon would give them the ability to view only their individual grades inserted by a teacher.

The teacher facilitating the course would be available through an “instructor” icon which normally contains a personal narration and welcoming message from the instructor along with a photograph and at least three convenient ways to contact him/her. The students would be encouraged to start off the course by posting a parallel introduction about themselves. This gives them a chance to get to know their classmates and find friends with similar interests. The students need to feel secure that there is someone there guiding them, concerned about their success, and is available to answer their questions and concerns in a timely manner.

3.3 Hardware and Software Options

There are an array of hardware and software options at the disposal of any media team including various brands of streaming audio and video, animations and graphics software and hardware. The following comparison sites are a great way to make informed decisions.

- Yahoo's Multimedia Software Comparison:
http://dir.yahoo.com/Business_and_Economy/Business_to_Business/Computers/Multimedia/Software/
- Comprehensive Course Management Comparison:
<http://www.edutools.info/course/compare/all.jsp>

In addition, there are publisher driven courselets or "e-packs". These are sets of customisable online course materials developed and formatted by educational publishers. They usually compliment a set of online course content and/or correspond to a textbook. From this array of choices, an instructional designer has to be able to select the most educationally worthwhile preference depending on the curriculum, overall educational payoff and the technology available to the learner. The design also has to be adaptable to imminent technology movements.

Many people believe that the future of e-learning lies in m-learning (mobile learning). Basically, m-learning is an collection of existing learning experiences: elearning, PDAs (personal digit assistants), wireless networks, and cellular communication. At this point, the infrastructure and tools are currently in place for m-learning. The next two obstacles are course content creation and social acceptance.

4.0 Educational Considerations

Obviously, there are many levels of lessons to be learned when designing for the online medium. The following information provides key points to be cognisant of during the process of designing, developing and delivering online courses.

4.1 Lessons Learned

4.1.1 During the Design Phase

- **Hire a instructional designer.** The ID should also be a project manager who is allowed control over the media team, budget, timeline and educational strategy. George Siemens (2002) remarks, "The growth and success of elearning is closely linked to the design of quality learning, enabled through the use of technology. Instructional designers play the pivotal role of bringing together these disparate fields - for the benefit of students, instructors, and organizations. Many of the concerns of online learning drop out rates, learner resistance, and poor learner performance can be addressed through a structured design process. The resulting benefits - reduced design costs, consistent look and feel, transparency, quality control, standardization - make organizational investment in ID a simple decision."
- **Know your audience.** There should be a through needs assessment conducted by a marketing expert to determine the demographic of the target learner, the general level of computer skills to be expected and the anticipated access to a functional media equipped computer. For instance, if you plan to market to mariners who

spend weeks and months aboard ships you will need to know what computer hardware and software they generally will be working with.

- **Plan to create a set of courses.** Students are constantly asking for a suite of courses that would constitute a programme. Often times, their employers will pay for the course in this scenario but will not fund random single courses that will not build towards a credential of some sort.
- **Introduce a project plan.** The art and science of project management and scheduling needs to be emphasized to all members of the team but in particular the instructional designer. The instructional designer has to lead the team and keep everyone on time and on budget (see Appendix B).

4.1.2 During the Development Stage

- **Require committed content experts.** Persistently instructional designers complain about their subject matter experts (SMEs) and are often left feeling like pests. SMEs are often overwhelmed by the amount of work it takes to prepare a course for online delivery, the instructional design process and the seemingly constant timelines (see Appendix B). The SMEs need to be informed about the process and committed to the project.
- **Keep it simple and worthwhile.** With the array of hardware and software choices available, instructional designers need to be able to select the most trouble-free, worthy solution to the problem while keeping the consistency of the teaching and learning experience. Often times a more simpler approach is the more successful one.
- **Deal with copyright upfront.** Each country has their own rules and regulations concerning copyright and these laws must be abided by or legal action could result. When publishers/authors are informed that the requester works for an educational institution, has no desire to repackage their material for their own commercial gain, and the content will reside under a password protected site, they usually readily agree to copyright permission – provided they are appropriately credited.
- **Create an early prototype.** The subject matter expert, the instructional designer and the graphic designer need to work together to produce and agree upon the initial template. Either a course shell or the first chapter should be produced, circulated and edits discussed. After the team concurs on the course's form and function, they should agree to move forward without further major style changes.

4.1.3 During the Delivery Stage

- **Teach the teachers.** Both before the start of the course and during the course pilot, the online teacher needs to be supported and guided by an online expert. This person could be the instructional designer or an experienced online teacher who would act as a mentor. As George Siemens (2002) notes, "Teaching online involves acquiring a new set of beliefs about what it means to be a teacher".
- **Connect with the students.** The students will need to know that there is someone on the other end of this experience who is concerned about their success. The instructor has to make them feel comfortable, secure and part of the online community. Without these considerations, failure and attrition rates soar.

- **Prepare for distance logistics.** The registration department at your particular institutions needs to invent a plan of action to provide online registration, payment of fees, and student support as required - all via distance.
- **Provide technical support.** Today's students expect and demand technical assistance. There should be an online student web portal to answer frequently asked questions, address issues such as etiquette, the role of the student and teacher, and an array to ways to contact a technical help assistant. The user should be guaranteed a response in 24 hours.
- **Encourage continuous student feedback.** Students should be encouraged to fill out the anonymous, online feedback form - not just at the end but also during the course. This gives the instructor time to reflect and improve the course in the same term.

6. Conclusion

New teaching and learning models are continually emerging and critical features are surfacing as being necessary for success. To create an organizational structure that fosters and facilitates the use and development of online education and systems that promote efficiency for e-learning you will need: an experienced instructional designer and multimedia team; a thorough needs analysis to determine the demographic of the target learner; a systematic course design, development and delivery plan; committed, prepared and supported content experts and instructors; a distance education logistic strategy for delivery; a team environment where continuous improvement is the goal; and a clear, institute wide, e-learning vision.

In the world today, the integration of new technologies and online learning is inevitable in all post-secondary education. The marine education sector holds its own particular challenges with respect to content creation, international quality standards, and client needs. To be an educational leader in this field, an institution will need to strongly encourage an organizational cultural change where a commitment to excellence in marine teaching and learning, professional development, and emerging e-learning technologies leads the way.

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Appendix A

Division of Degree Studies and Research

Instructional Design Report
for distributed learning courses

Course Name and Number: _____
School/Unit: _____
Media Partner: _____
Date of first contact meeting: _____
Projected Target Date: _____

Content Developer(s):
Name: _____
Phone: _____
E-mail: _____

Primary Mode of Delivery:

| | | | |
|---------|-----|-----------------|-----|
| On-site | ___ | Correspondence | ___ |
| CD-ROM | ___ | Teleconference | ___ |
| www | ___ | Videoconference | ___ |

Media Component Forecast:

| | | |
|---------------------|-----|-------|
| Print: Textbook(s): | ___ | _____ |
| Course Manual: | ___ | _____ |
| Resources: | ___ | _____ |
| Teleconferencing: | ___ | _____ |
| Videoconferencing: | ___ | _____ |
| Graphics: | ___ | _____ |
| Video: | ___ | _____ |
| Audio: | ___ | _____ |
| CD-ROM: | ___ | _____ |
| Library research: | ___ | _____ |
| Web: Course Notes: | ___ | _____ |
| Communications: | ___ | _____ |
| Programming: | ___ | _____ |
| Applications: | ___ | _____ |

Minimum design requirements for CD-ROM or Web development:

- ___ The ability to compile and print the entire content or assignments or activities.
- ___ Video clips must be accompanied by controls i.e. stop, pause, play, etc.
- ___ Navigation must be consistent and available on every page.
- ___ The ability to resume your session where you left off.
- ___ The ability to save assignments/activities to your own directory.
- ___ All fonts used should be available in the default settings
- ___ All courses in a common programme should have a consistent look and feel.
- ___ The font size should be no smaller than 12 point.
- ___ The development should be prepared using a 800 x 600 resolution.

Assessment Plan:

Additional Notes:

Signed: _____

Date: _____

Appendix B

Division of Degree Studies and Research

Development Checklist

A. Curriculum Development & Planning Phase

1. Review Other Online Offerings of Similar Courses
2. Develop:
 - proposed learning objectives;
 - topic/concept map (i.e., learning path);
 - structure and organization (via lesson plans);
 - draft (or loose) course schedule;
 - student assessment strategy (e.g., assignments, exams, etc.)
 - content information present in sufficient form
 - interactive content & activities suitable for an online environment
 - potential media resources associated with topics/concepts;
 - possible third-party copyright requirements (and associated details);
 - potential media requirements; and
 - a target date for initial (pilot) offering.

B. Instructional Design/Development Phase

1. Conduct a team meeting outlining the project:
 - Define Scope of project
 - Devise and Discuss Project Process
 - Present Proposed Timeline
 - Invite Input for Task Breakdown
 - Set Monitoring and / or Progress meetings
 - Establish Progress Meeting Format
2. Team Brainstorming / Establish Design Concepts and Instructional Methodologies
3. Completion of Instructional Design Report (incl. team sign-off)
4. Generate Activities, Self Tests, Answer Keys
5. Copy-edit all “raw” content

6. Identify Media Requirements
7. Identify Audio / Video / Animations / Photos / Graphics / etc.
8. Generate a Project Media Matrix
9. Document Any/All Copyright Permission Requirements
10. Identify Sequence and Structure for Media and content Integration
11. Develop Storyboards (applicable to ALL technologies)
12. Develop Blueprint Design
13. Adapt Assignments
14. Seek Copyright Permission for Third-Party Material
15. Acquire Identified Media and Materials
*Ensure release forms are signed for "home-grown" media products involving human subjects.
16. Develop Prototype(s)
17. Review and Edit (as necessary)
18. Revise Accordingly
19. Develop "Alpha" Product(s)
20. Review and Edit (as necessary)
21. Copy-edit all "new" content and product related instructions
22. Internal Review
23. Revise Accordingly
24. Develop "Beta" Product(s)
25. External Review ("Pilot-Offering" or "Beta Test")
26. Revision of Final Product