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1.0 POLICY/PURPOSE

Santa Barbara Applied Research (SBAR) controls and verifies the design of SBAR products and services to ensure that the specified requirements are met. The purpose of this SBAR work instruction (WI) is to define the storyboard design and development process for interactive multimedia instruction (IMI).

2.0 SCOPE

This WI applies to all SBAR operating units within the MCA Engineers Division, Ventura, CA (VTA). The WI will be used for all MCA Engineers Division IMI or computerbased training (CBT) systems, unless otherwise specified by contract.

3.0 REFERENCES AND DEFINITIONS

3.1 References

ISO 9001: Quality Management Systems-Requirements, Third Edition (2000-12-15)

- ISO 9001 Element 7.3, Design and Development
- SBAR Quality Manual
- SBAR Control of Quality Records Procedure
- MIL-HDBK-29612-1, Department of Defense Handbook, *Guidance for Acquisition* of Training Data Products and Services
- MIL-HDBK-29612-2, Department of Defense Handbook, *Instructional Systems Development/Systems Approach to Training and Education*
- MIL-HDBK-29612-3, Department of Defense Handbook, *Development of Interactive Multimedia Instruction (IMI)*
- MIL-HDBK-29612-4, Department of Defense Handbook, Glossary for Training
- MIL-PRF-29612A, Department of Defense Performance Specification, *Training Data Products*
- DODI 1322.20, Department of Defense Instruction, *Development and Management of Interactive Courseware (IMI) for Military Training*

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- AFH 36-2235 Volume 2, Air Force Handbook, Information for Designers of Instructional Systems, *ISD Automated Tools/What Works*
- AFH 36-2235 Volume 5, Air Force Handbook, Information for Designers of Instructional Systems, *Interactive Courseware (IMI) Design, Development, and Management Guide*
- CNETINST 1500.21A, Chief of Naval Education and Training Instruction, Development, Acquisition, and Management of Interactive Courseware (IMI) in Support of Instructional Systems within the NAVEDTRACOM
- OPNAVINST 1500.73, Development, Acquisition, and Management of Interactive Courseware (IMI) for Navy Training
- TRADOC PAM 350-70-2, Department of the Army, *Training Multimedia* Courseware Development Guide

3.2 Definitions

<u>Attitude (A)</u>: The mental state of a person that influences behavior, choices, and expressed opinions.

Authoring: A structured approach to developing all elements of a unit of instruction.

Branching: An instructional operation where a selection is made between two or more possible courses of action depending upon some related fact, condition, or user response. Two or more directions a program path can go from a decision point.

<u>Computer-Based Training (CBT)</u>: Instruction delivered with the aid of a computer.

Computer-Managed Instruction (CMI): The use of computers and software to manage the instructional process. CMI functions can include student registration, student performance, course and lesson performance, test monitoring, and other training management functions.

Functional Area Manager (FAM): A senior supervisory individual who is responsible for the leadership, direction, and overall success of an area of the company, such as procurement, specific contracts, logistics, training, quality, safety, engineering, finance, etc.

Instruction: The delivery of information to enable learning. The process by which knowledge and skills are transferred to students. Instruction applies to both training and education.

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Instructional Designer (ID): A senior individual who is responsible for the leadership, direction, and overall success of the IMI design, development, and deployment team.

Instructional Strategy: The general concept by which instruction is to be delivered to the student (e.g., programmed learning, traditional learning, exercise learning, small-group learning, whole-group learning, mentor or apprentice learning, etc.).

Instructional Systems Development (ISD): A process for the analysis, design, development, implementation, evaluation, revision, and operation of interrelated training elements. A logical process for effectively and efficiently determining what, where, when, and how tasks should be taught.

Interactive Courseware (ICW): Computer-controlled courseware that relies on trainee input to determine the pace, sequence, and content of training delivery, using more than one type of medium to convey the content of instruction. ICW can link a combination of media, including, but not limited to, programmed instruction, video tapes, slides, film, television, text, graphics, digital audio, animation, and full-motion video, for enhancing the learning process.

Interactive Multimedia Instruction (IMI): A term that is applied to a group of predominantly interactive, electronically delivered training and training support products. IMI products include instructional software and software management tools used in support of instructional programs. IMI is a component of ICW.

Knowledge (K): Specific information required for the student to develop the skills and attitudes for effective accomplishment of the jobs, duties, and tasks.

Learning: The act, process, or experience of acquiring a knowledge, skill, or attitude.

Learning Objective (LO): A statement of the behavior or performance expected of a trainee as a result of a learning experience, expressed in terms of the behavior, the conditions under which it is to be exhibited, and the standards to which it will be performed or demonstrated. LOs typically direct a student to acquire a knowledge (K), skill (S), or attitude (A).

Lesson: A segment of instruction that contains one or more learning objectives, information to be imparted to the student, and may contain an evaluation instrument. The lesson is designed in detail and is the basic building block of all training.

Module: A stand-alone instructional unit that is designed to satisfy one or more learning objectives. It is a separate component, complete within itself, that can be taught, measured, and evaluated for a change or bypassed as a whole; one that is interchangeable with others, used for assembly into units of differing size, complexity, or function. A module consists of one or more lessons.

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<u>On-the-Job Training (OJT)</u>: Training in a designated job skill that is provided at the job site.

Process: A set of interrelated resources and activities that transforms input into output. Specifically, processes are the manner in which SBAR combines resources (e.g., personnel, equipment, and materials) in order to deliver its products and services. Processes include, but are not limited to, program management, contracts management, financial management, quality program, operations and maintenance, corrosion control, logistics, etc.

<u>Record</u>: Document/data that furnishes objective evidence of activities performed or results achieved. Records provide objective evidence of the fulfillment of specified requirements. Records include, but are not limited to, procedures, inspection reports, training records, drawings, etc.

Skill (S): The ability to perform an activity that contributes to the effective completion of a task.

Storyboard: A layout and detailed graphic description of a single frame or series of frames, arranged sequentially. The frames describe the action and content of the IMI and specify all details, such as graphics, text, visuals, video, audio, and special effects. It is a graphic depiction that shows the IMI presentation.

<u>Subject Matter Expert (SME)</u>: An individual who has a thorough knowledge of a job, duties/tasks, or a particular topic.

Task (T): A single unit of specific work behavior, with clear beginning and ending points, that is directly observable or otherwise measurable. A task is performed for its own sake, that is, it is not dependent upon other tasks, although it may be performed in sequence with other tasks in a mission, duty, or job. A task is typically accomplished with a laboratory exercise, simulation, or virtual model.

<u>Technical Editor</u>: The individual responsible for reviewing a document and ensuring compliance with contract specifications and customer requirements.

<u>Training</u>: Instruction and/or applied exercises for the attainment and retention of knowledge, skills, and attitudes.

Work Instruction (WI): Written details that, when appropriate, state what shall be done and by whom; when, where and how it shall be done; what materials, equipment and documents shall be used; and how it shall be controlled and recorded. WIs will normally be used to implement corporate procedures and/or specific contractual requirements.

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4.0 **RESPONSIBILITIES**

4.1 Training Systems Manager

The Training Systems Manager is responsible for implementing this WI.

4.2 Office of Primary Responsibility (OPR)

The OPR is the agency assigned the duty of managing a specific program or completing a specific task. The OPR:

- Implements the requirements of this document.
- Implements a test program to verify compliance.

4.3 Functional Area Managers (FAMs)

FAMs are responsible for implementing the requirements identified within this development standard. FAMs:

- Manage the quality requirements and ensure that the criteria contained herein are incorporated into the design requirements of the IMI.
- Conduct quality audits and design reviews to verify compliance.

4.4 Instructional Designer (ID)

The ID is the senior individual who is responsible for the leadership, direction, and overall success of the IMI design, development, and deployment team. The ID:

- Develops instructional strategies, the IMI content, and the design requirements
- Oversees the IMI and media development team
- Oversees product testing and directs the overall development process.

4.5 IMI Developers

Unless otherwise directed by the Training Systems Manager in conformance to specific requirements imposed by a contract, each SBAR employee involved in IMI will conform to this standard for storyboard development.

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5.0 **REQUIREMENTS/PROCEDURES:**

5.1 **Purpose of Storyboards**

Storyboards are used to develop the actual screen presentations for an IMI. The general IMI design principles that will be considered when developing an IMI storyboard include:

- User friendliness
- Menu-driven design
- Browsing alternatives
- Help functions
- Record tracking
- Navigation
- Impact of type of input devices used
- User messages
- Cues
- The capabilities of the selected authoring software.

5.2 Storyboarding Design Process

The storyboard is the most essential element in the design and content of a successful IMI. SBAR develops the storyboards for all assigned IMI projects. Changes are to be expected during the development of storyboards. It is cost effective to print storyboards for instructional and technical editions, because the cost of storyboarding represents a fraction of the cost that is required for editing the IMI on-line.

Storyboards must be reviewed by the ID and the SME. The ID ensures that the storyboard is instructionally sound, and the SME verifies that the storyboard is technically accurate. The ID and the SME must approve the storyboard before the IMI development phase begins.

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5.2.1 Storyboard Design Software Tools. Although there are several commercial products available specifically for storyboarding, all SBAR storyboards will be designed using Microsoft Power Point in the Notes Page view. Figures 5-1 through 5-6 show simplified examples of the different storyboard sections/templates.

5.2.2 How to Write a Storyboard

- Step 1. Determine what standard screen layouts will be required for the course. Screens can have different functions. When the frame types are designed, they should become standard. No new layouts should be permitted. Layouts can be designed to accommodate screens for:
 - a. Standard instructional elements screen format
 - Graphics with text (i.e., graphic on the left side of the screen with text on the right side of the screen)
 - Animation with text (i.e., animation on the top half of the screen with text on the bottom half of the screen)
 - Video with text (i.e., video window in the right side of the screen with text on the left side of the screen).
 - Objectives, tests, questions, practice exercises, reviews, and games.
 - Drag and drop
 - Matching
 - b. Main menu, submenus, and other interactions.
- **Step 2.** Develop templates that will be used for all standard screen types. Using templates will:
 - a. Provide the course with a look and feel that is consistent throughout the courseware
 - b. Help writers limit the amount of screen elements (graphics, text, videos) used in a given frame

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- c. Provide a standard interface for learners, making courseware user friendly
- d. Save production time because standard storyboarding pages can be used repeatedly.
- **Step 3.** For each IMI product, follow an established course architecture and flowchart for the content and sequence of the course. Figure 5-1 represents how basic course architecture is laid out. A storyboard or series of storyboards is created for each item on the course architecture map. The flowchart provides basic branching information.
- **Step 4.** Adhere to course conventions and design decisions in the design documents, giving the courseware a consistent professional look making it user-friendly.
- **Step 5.** Fill out every field that applies to a given screen. Most of the fields on a storyboard are optional, but many are used to create things like video shot lists, graphic description lists, etc.

The storyboards should be detailed enough:

- For the SME to visualize and understand what will happen frame by frame.
- For video, audio, graphics, and animation experts to visualize and follow the concepts envisioned when the course was designed.
- For reports of information to be sorted and printed. These reports are invaluable for planning the production of video, graphics, audio, and animation.
- **Step 6.** Provide branching information. Provide a path for the lesson's author to follow. Indicate every possible branch in the interaction. Provide a unique destination for every possible student choice.
- **Step 7.** Provide feedback and remediation. Provide feedback and remediation for all anticipated learner performance and responses.

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- **Step 8.** Provide requirements for course-managed instruction (CMI). Indicate all data that needs to be scored, collected, or recorded. Examples of CMI are:
 - Student log-in information
 - Courseware performance
 - Text question randomizing.

5.3 Storyboard Components

This section describes in detail each integral component of the storyboard. Although the content of each project will be different, the format of the storyboard (i.e., basic layout, fields, etc.) will always remain the same.

5.3.1 Acceptance and Approval Page. The approval and acceptance sheet (Figure 5-3) is used to represent quality assurance control, development team recognition, and most importantly, customer acceptance. Signed acceptance by the customer of a storyboard, constitutes authorization for the development of that lesson or topic.

5.3.2 Style Guide Section. The Style Guide section of the storyboard provides high-level details that are critical for the courseware developers of an IMI. Using a consistent style throughout an IMI is crucial. Students should learn the course material, not how to continually navigate through the IMI. Items found in the Style Guide section include navigational controls, standard text conventions, and screen layout conventions. Figures 5-4 and 5-5 represent a sample of how the style guide section will be laid out. Specific details of IMI style guides and content standards can be found in the *IMI Style Guide Work Instruction* for IMI Media and Content Standards.

5.3.3 Course and Lesson Architecture. This section of the storyboard provides a generalized flow chart of the entire IMI and each lesson within the courseware. This architecture is used to identify courseware navigation.

5.3.4 Screen Page Layout and Content. Each storyboard is a representation of a screen or screen sequence within each lesson/segment. Storyboards provide explicit information on how an IMI lesson will look, sound and function. Consideration must be given to the general principles, as well as to the visual, audio, and programming elements. The storyboard contains specific notes to the SME, ID, courseware author, graphics artist, programmer, etc. Figure 5-6 represents the basic format of a storyboard that SBAR will use. The storyboard is comprised of ten fields. The following subparagraphs describe each of these fields in detail.

5.3.4.1 Section/Screen Identification Code. This field contains an alphanumeric code. Each screen has its own unique code for ease of identification and branching/navigational instruction.

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5.3.4.2 Learning Objective(s). The applicable learning objective(s) number(s) are entered into this field. This provides several advantages. First, it is much easier to establish test questions on the material when the applicable subject matter screens are conveniently correlated with the learning objective(s). Second, conversion of the curriculum material into a database environment can be accomplished much more effectively.

5.3.4.3 Title. Titles are a very important aspect of each screen. The title assists in reinforcing to the student the current information that is being taught. It is important to keep the title scheme consistent throughout the IMI. Using each lesson name for a title is an example of how to apply this scheme.

5.3.4.4 Subtitle. Subtitles are another important element in delivering IMI curriculum. The subtitle provides a more descriptive indication to the student about what instructional elements are being taught. The screen subtitle augments the screen title.

5.3.4.5 Authoring/Programming Notes. This field is critical for the courseware development team. Any comments that aid in the transition between the SME and the courseware developers need to be entered into this field by the ID. Some examples of items that should be incorporated into this field are:

- Type of input/output device to be used (e.g., joystick, light pen, mouse, touch panel, graphics and animation tablet, keyboard, optical digitizer, trackball, bar code reader, printer)
- Special effects (e.g., animation, highlights, video, and computer-generated video graphics)
- Editing transitions and types (e.g., wipe, dissolve, fade to/from black)
- Screen transitions and types (e.g., wipe, dissolve, fade to/from black)
- Direction for narration, audio, and/or video synchronization
- Exact location of each cue (e.g.; callout arrow, highlighting) and the user's required response to that cue
- Special interactions, specific to a particular screen, with directions indicating the desired effect and response (e.g., drag and drop, special buttons, hot spots, etc.)

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5.3.4.6 Text. This field displays the text that is represented on the screen. The exact text may be entered, or a text identification number may be entered to conserve space. The text identification number can then refer a developer to a Microsoft Word document that contains the actual text files. Some considerations for entering data into this field are:

- Instructional text (exact script)
- Command text (exact script)
- Header/figure titles (exact script)
- Lesson objective text (exact script)
- Test and answer keys (exact script)
- Feedback text (exact script)

5.3.4.7 Graphics/Video Animation. This field identifies the screen requirements for any graphics, video, and animation. Some examples of items that should be incorporated into this field are:

- Detailed graphical drawings, pictures, photocopies, or photographs
- Animation, with detailed sketches to depict each animation sequence
- Video with exact script
- For a video script, sketches of the shots and camera angles, as well as camera movements (trucks, zooms)
- Preferences/requirements for video, picture, and animation formats.

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5.3.4.8 Audio. This field identifies the requirements for any narration, music, or sound effects. Some examples of items that should be incorporated into this field are:

- Audio requirements (e.g., narration, dialogue, sound effects, music, ambient sound)
- Nonverbal audio clips with detailed direction of sound development required (e.g., music clip, sound effect, decibel level, compression)
- Narration audio with exact script

5.3.4.9 Navigation. This field identifies the requirements of the courseware navigation. Each possible branching location is identified. This ultimately simplifies a portion of the quality assurance testing process. Some considerations for entering data into this field are:

- Navigational icons that indicate which buttons are active and which are inactive
- Branching location of each navigational icon

5.3.4.10 Graphical Screen Representation. This element of the storyboard is extremely beneficial to the development team and the customer. The development team can easily identify the location of multimedia, text, and navigational controls. The customer can readily assess the look and feel of a screen by looking at the graphical screen representation.

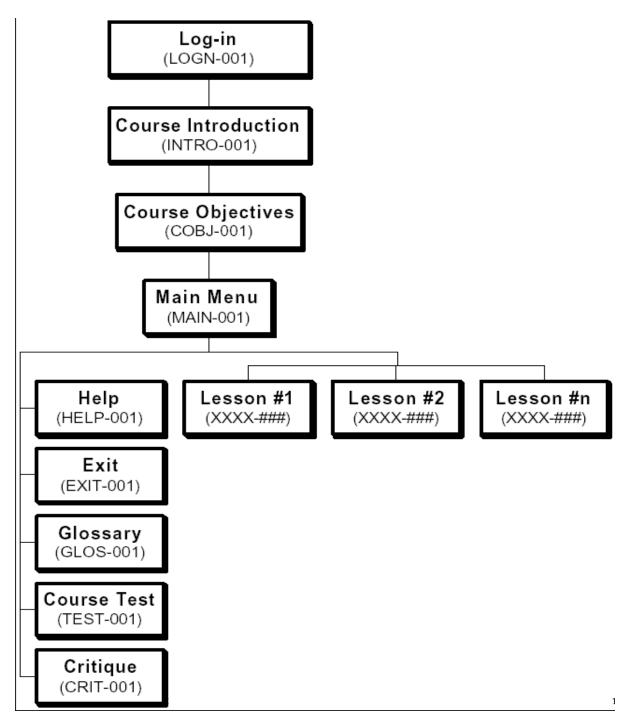
5.3.4.11 SBAR Quality Assurance Acknowledgement. After the storyboard has been authored, QA checks must be performed. The courseware tester checks each screen against the storyboard to see if the screen contains all of the correct information (paragraphs 5.3.4.1 through 5.3.4.10).

5.4 Records

All final delivered storyboards shall be maintained in the applicable contract deliverable file.

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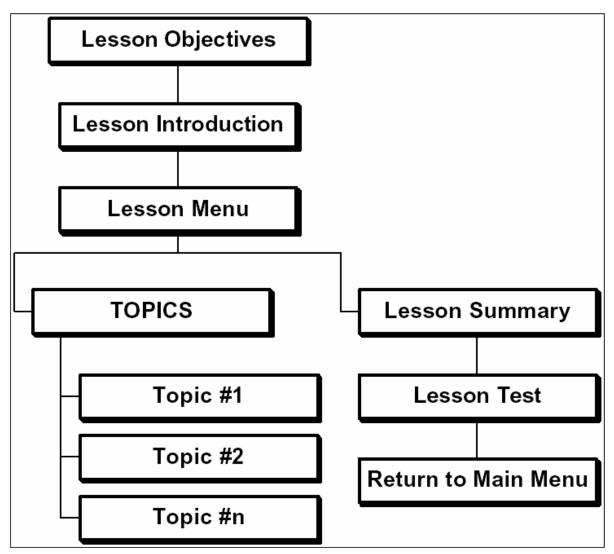
Figure 5-1. Sample IMI Course Architecture



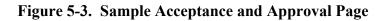
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ACCEPTANCE AND APPROVAL PAGE		
Accepted by:		
Graphics Department Supervisor	Date	
Programming Department Supervisor	Date	
Technical Editor	Date	
Subject Matter Expert	Date	
Training Systems Manager	Date	
Approved for development by:		
Government Representative	Date	

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Figure 5-4. Sample Style Guide Section (1 of 2)

SYTLE GUIDE:					
Table X-X. Navigational Controls					
Control		Description			
NEXT		Advances the	user to the nex	t screen.	
PREVIOUS		Returns the us	ser to the previo	us screen.	
MAIN MENU	Main	Takes the use	Takes the user to the main menu.		
MENU	menu	Returns the u	Returns the user to the previous menu in the hierarchy.		
EXIT	×	Allows the use	Allows the user to exit the IMI.		
HELP	Tu-a	Provides the u	Provides the user with navigational function assistance.		
GLOSSARY	0-DARELA	Displays term	Displays terms, acronyms, and abbreviations		
	Table	X-X. Standard	Text Conve	ntions	
Text Des	cription	Font Type	Size	Color	
Screen Title		Arial	20	R: 0 G:204 B:153	
Screen Subtitle		Arial 18 R:211 G:175 B: 65			
Standard Less	on	Arial 16 R: 255 G: 255 B: 255			

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20

16

16

14

12

R: 38 G: 51 B:255

R:255 G:255 B:255

R:255 G:255 B:255

R:255 G:255 B:255

R:211 G:175 B: 65

R:255 G:255 B:255

Arial

Arial

Arial

Arial

Arial

Arial

Hot and Roll-out Words

Main Menu Lesson Titles

Supplemental Data/

Sub-Menu

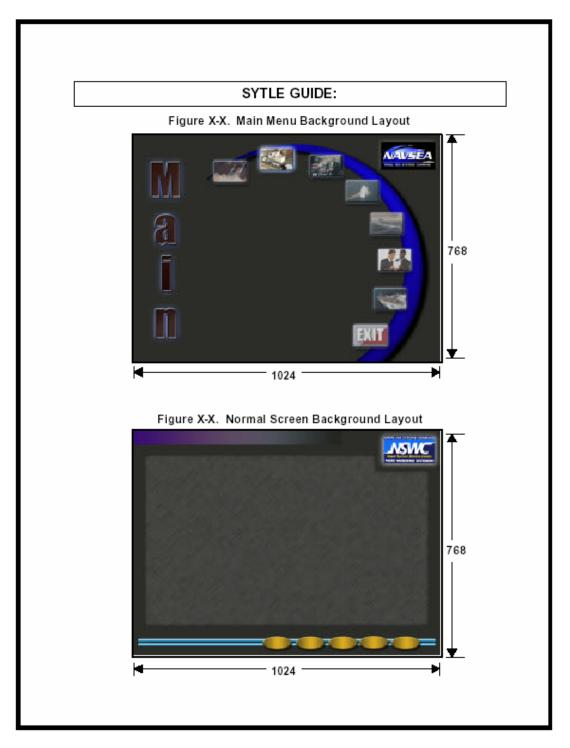
Question

Feedback

Graphic Labels

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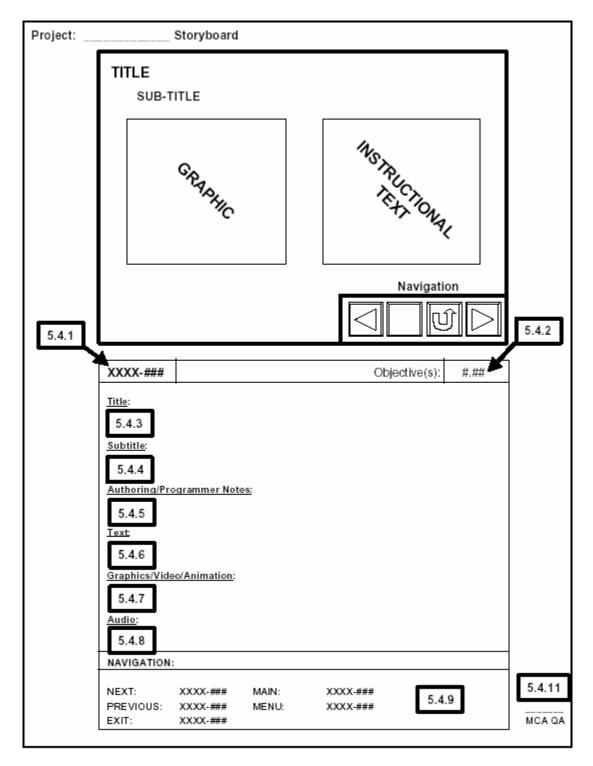
Figure 5-5. Sample Style Guide Section (2 of 2)



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Figure 5-6. Sample Storyboard Screen Page Layout



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