Shuttle Case Study Collection Website Development

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As a continuation from summer 2012, the Shuttle Case Study Collection has been developed using lessons learned documented by NASA engineers, analysts, and contractors. Decades of information related to processing and launching the Space Shuttle is gathered into a single database to provide educators with an alternative means to teach real-world engineering processes. The goal is to provide additional engineering materials that enhance critical thinking, decision making, and problem solving skills. During this second phase of the project, the Shuttle Case Study Collection website was developed. Extensive HTML coding to link downloadable documents, videos, and images was required, as was training to learn NASA's Content Management System (CMS) for website design. As the final stage of the collection development, the website is designed to allow for distribution of information to the public as well as for case study report submissions from other educators online.

Nomenclature

CDS = Collection Display Size
CMS = Content Management System
HTML = HyperText Mark-up Language
IPT = Item Presentation Template
NASA = National Aeronautics and Space Administration
SCSC = Shuttle Case Study Collection

I. Introduction

The Shuttle Case Study Collection is John F. Kennedy Space Center's newest educational resource. Designed especially for high school educators, university professors, and their students, users of the new collection can gain a backstage pass into the 30 year history of NASA's Shuttle Program. Originally developed during summer 2012, the Shuttle Case Study Collection's mission is to provide educators with engineering case studies which focus on Shuttle's maintenance, processing, and development. Enhancing engineering curriculum is a critical objective as is providing students with real world experiences which encourage the development of decision making, critical thinking, and problem solving skills.

Lessons learned documents, which contain the official, reviewed learned lessons from NASA programs and projects, are used as the basis for each case study. Typically brief and not suitable for direct use in the classroom, lessons learned documents are further researched and developed into complete case study reports. Specifically, these reports may provide additional details into the related Shuttle mission, its crew, unique system anomalies, testing, or design modifications as applicable. Educators may use these reports, with accompanying epilogue and teaching notes, to allow their students to participate in group discussions, activities, or open-ended research.

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Through the case study reports, students are encouraged to imagine themselves as NASA team members responsible for making critical decisions related to the Shuttle Program.

For fall 2012, the development of the Shuttle Case Study Collection (SCSC) is continued with the design and development of its website. The objective of this research project is to develop a website suitable for hosting SCSC. The website needs to be capable of storing a growing database or collection of written case studies related to the Shuttle Program. It should also have the capacity to allow online users such as high school educators, university professors, and NASA civil servants to submit their own case studies to the collection for review. Other capabilities include hosting image galleries, short videos, and additional multimedia content. The website will allow for distribution of case study materials to the public as well as correspondence between case study users and the collection's management. As the final stage of the SCSC development, it is essential for the website to be user friendly for maximum public use. The website must also comply with NASA regulations while integrating with other education sites included within the NASA Portal. To meet these requirements, NASA's Content Management System or CMS is used.

I. Content Management System & Its Assets

Creating, designing, or editing a NASA website means publishing to the NASA Portal. It requires NASA Portal Publishing Training which includes learning the Content Management System or CMS. CMS helps to ensure that NASA websites are consistent in appearance and delivery[1]. Within CMS, content or assets are labeled as either a document or library item. Documents are considered structured while library items are unstructured. Documents are created to develop the bulk of content for a site and may include detail pages, snippets, collections, and landing pages. Library items are often created for multimedia objects such as images, videos, links, and downloadable content including PDFs.

However, before creating any assets, it is required to first select the appropriate category for the content. For example, because the SCSC website is for educators and developed at Kennedy Space Center, assets are stored under Content>Offices>Education>Centers>Kennedy>Technology. Document and library assets are stored in hierarchical categories that function much like directories or folders[1]. Categories within CMS conform to the NASA Portal Information Architecture, which is required for a NASA published website. Proper use of categories helps to ensure that published pages display with the appropriate navigation options. It is also essential to select the proper folder to ensure that the assets created are similar in format and appearance as related education pages or webpages for KSC. Once the proper folder is determined, assets may be created accordingly.

The end goal of using CMS is to create a published website or what is referred to as a landing or home page. However, before a landing or home page can be published, several steps are required which include the following:
1. Creating library item assets
2. Creating document assets
3. Creating a collection of documents
4. Creating a landing (index) page or collection of collections
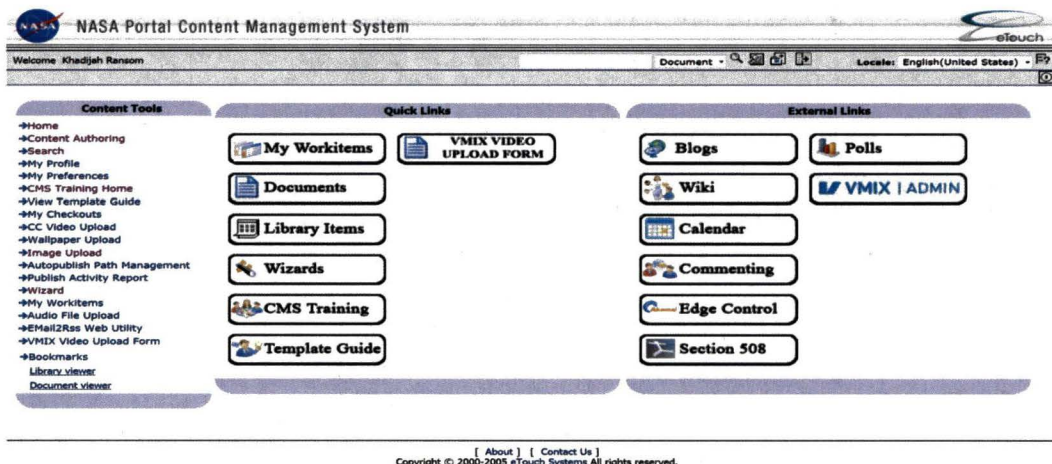5. Applying the publish workflow to appropriate assets

Figure 1. Content Management System Home Screen. *From the home screen of CMS, editors may access documents, library items, training services, and additional information for website design assistance.*
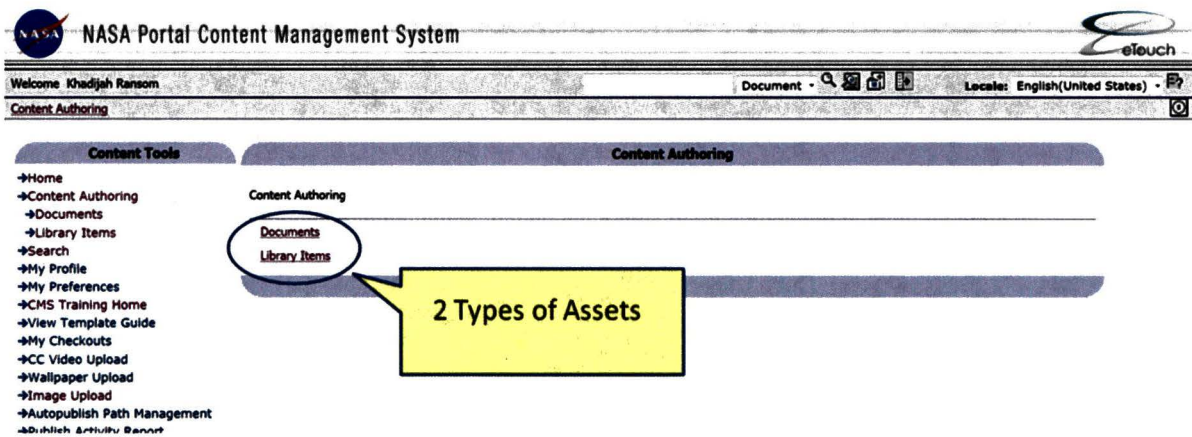
Figure 2. Content Authoring Screen. *There are 2 types of assets or content within CMS – documents and library items.*
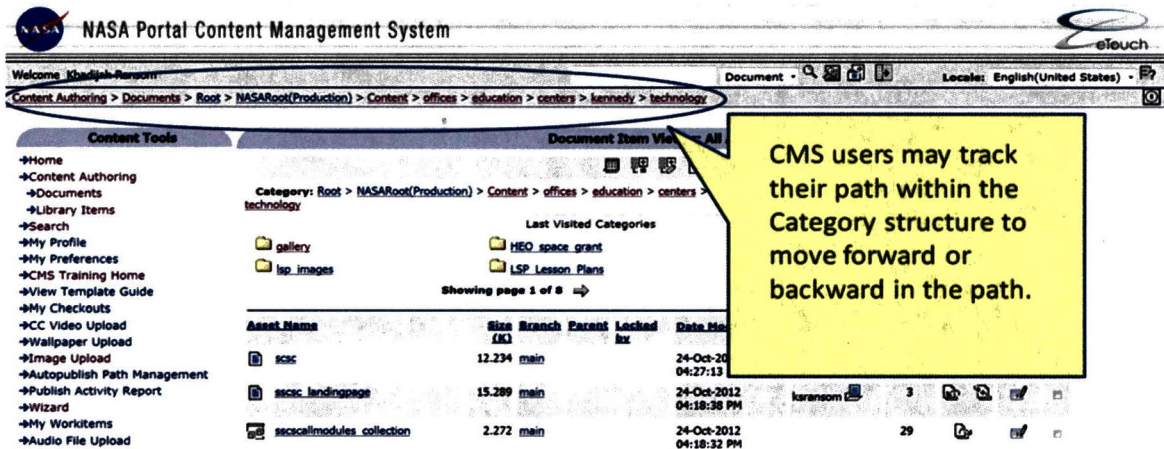

Figure 3. Category Structure Screen. *Document and library assets must be created and stored within the hierarchical categories that function much like directories or folders.*

II. Creating Library Item Assets

As one of the two types of assets, library items are reusable, unstructured pieces of content and typically include images, videos, and PDFs. To create library items, it is often necessary to complete some pre-processing steps, especially for images. Images typically require pre-sizing or processing using an image processing tool before creating an image asset in CMS[1]. For example, to meet the thumbnail image requirements, images must be 100 pixels wide and 75 pixels high[3]. These pre-sized images and/or media files may then be added to the CMS library area as library assets.

With files and/or images pre-processed, the first step for creating a library item asset requires defining its properties. An asset name with no spaces or special characters (with the exception of underscores and dashes) must be specified. Element type such as file, Flash, image, or link should be selected. Keywords and a description of the library item should also be defined within the properties during creation. For multiple items, bulk upload is an option[4]. Once property definitions are complete, CMS provides a successful completion pop-up window to allow users to proceed with content creation, the second step for creating a library item.

It is during content creation of a library item asset that users may browse their desktop or folders to locate the files or images to be uploaded. Additional and required components or properties may also be included under the content tab when creating library items. In particular, to conform to the 508 Compliant Rules and Regulations which govern the Web for disabled individuals, all images must include an alternate text component to visually describe the details of an image[3]. Other optional components to be selected or specified during content creation include borders and alignment.
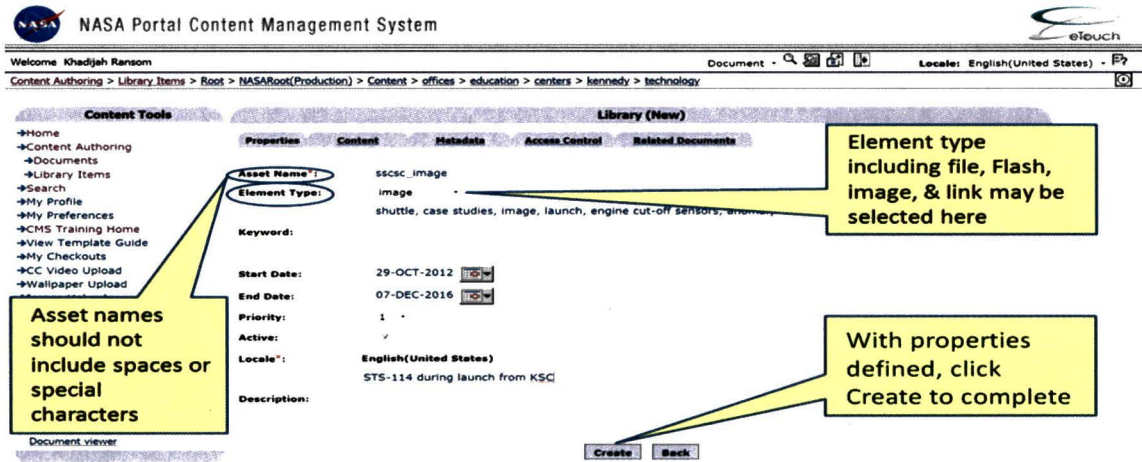
Figure 4: Library Item Properties Creation. *Properties including asset name, element type, and description should be specified when creating a library item.*
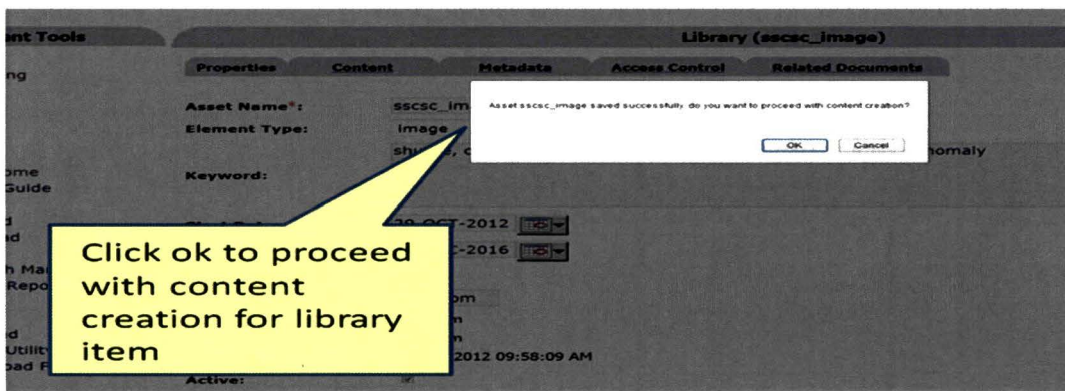

Figure 5: Library Item Properties Confirmation. *With all properties defined, a pop up box appears to confirm successful creation and to allow procession to content creation.*
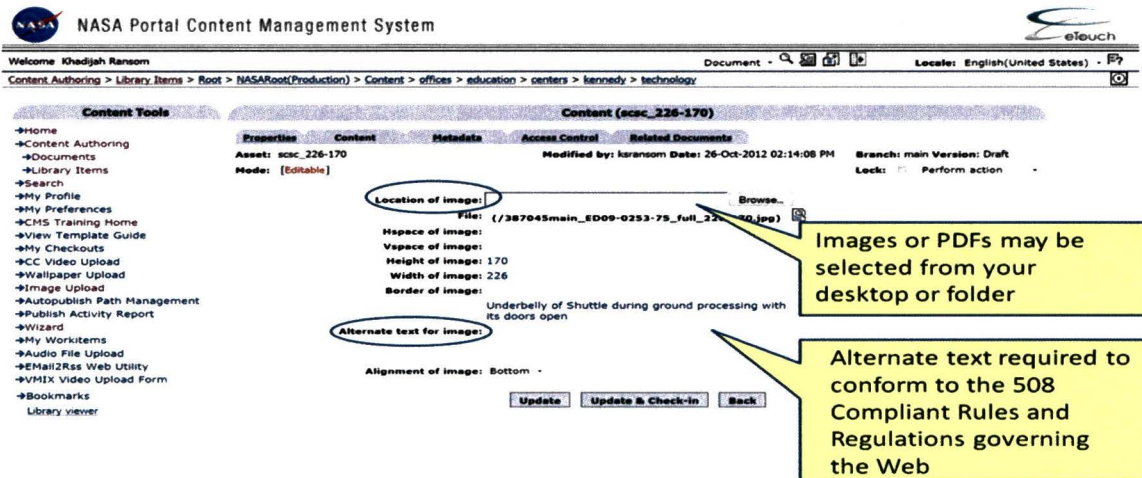

Figure 6. Library Item Content. *Reusable, unstructured content such as images and PDFs can be uploaded from your desktop or folder. Attributes such as alternate text are required for compliancy rules and regulations.*

III. Creating Document Assets

The second type of asset within CMS is simply referred to as a document and was required to display textual information related to the Shuttle Case Study Collection. Within CMS, documents are defined as structured content created using a provided selection of authoring templates, or special document types used for presenting content to define font color, sizes and other attributes[1]. Selecting an authoring template when creating a document is just an additional step to ensure that documents within the category or pre-selected folder match in style and appearance.

Similar to creating library item assets, there are required steps for successfully creating document assets. First, an asset name following the same rules of no spaces or special characters must be specified. Second, an authoring template and presentation template must be selected. Documents created within CMS are transferred into publishable, flat HTML pages using provided presentation templates. The document type, which can be either embeddable or non-embeddable, should also be selected. This option determines whether or not other documents or library items can be inserted into the new document. Document family options are also possible to specify which type of document you would like to create. For SCSC, the document families only included detail pages and snippets.

A. Detail Pages

Detail pages are just one of the many types of document assets or document family options that may be created within CMS. For the purposes of the SCSC website development, detail pages were the preferred format for displaying large amounts of text or information. With the property definitions complete, the content of the detail page can be created under the content tab, similar to creating library items. Included within the content of a detail page are areas for the title of the page, body, and promotional content.

1. Detail Page Body Content

Like many other developed web pages, the body content for SCSC detail pages was created using HyperText Mark-up Language (HTML). Basic HTML skills were required to add HTML tags to break and format paragraphs, tables, captions, headings, and to add additional features such as bold text, colored text, solid lines, and center alignment[2]. HTML tags were also required for adding hyperlinks to link within pages or to other pages, sites, etc. CMS also allowed for embedding library items such as images, videos, and other detail pages into the body of the page.

For each detail page created, the proper templates had to be selected and components had to be defined. Specifically, the body content had to include proper HTML tags to ensure all information was readable and organized. Throughout the entire creation of a detail page, CMS allows for the editor to preview its content. The preview option allows editors to see exactly how content would display on a published website once complete[2]. This made formatting tasks much easier as immediate editing was allowed after viewing. It also was beneficial in understanding the use of the correct authoring and presentation template. With the proper template and category location, information and additional navigation links related to Kennedy Space Center and NASA education were automatically included within the page without additional coding.

For the Shuttle Case Study Collection, several detail pages were necessary. SCSC content was separated to include instructions and general tips for using case studies and other areas for downloadable material links. To assist educators with using SCSC case study reports, a detail page was required for suggested uses. Within this page, teachers were provided advice on how to specifically use case studies in their classroom for class discussion, group activities, and open-ended research. Detail pages were also required to assist educators and other users of the SCSC website with writing their own case study reports, epilogues, and teaching notes. Additionally, there were detail pages for frequently asked questions, contact information, mission statement, and review process information. Over fifteen pages were required for the initial development of the SCSC site.

2. Detail Page Promotional Content

Promotional content is an additional component of detail pages. Promotional content determines how viewers will see information related to your page from the main site or landing page. Users often view this content in terms of advertisement. CMS provides an area for a promotional title, thumbnail image, and leader sentence. These components are what users will see once the page is listed in a collection (to be further addressed later) with other pages. The title should indicate the topic of your detail page while the thumbnail image should be an interesting picture related to your page. The promotional leader sentence is a brief paragraph summarizing the detail page's main ideas or subjects.

Figure 7. Detail Page Properties Creation. *Detail page properties or attributes including authoring template and document type must be selected.*

Figure 8. Detail Page Content Creation. *Content, including the main body or information of the page, may be added to detail pages and should be formatted using HTML tags.*
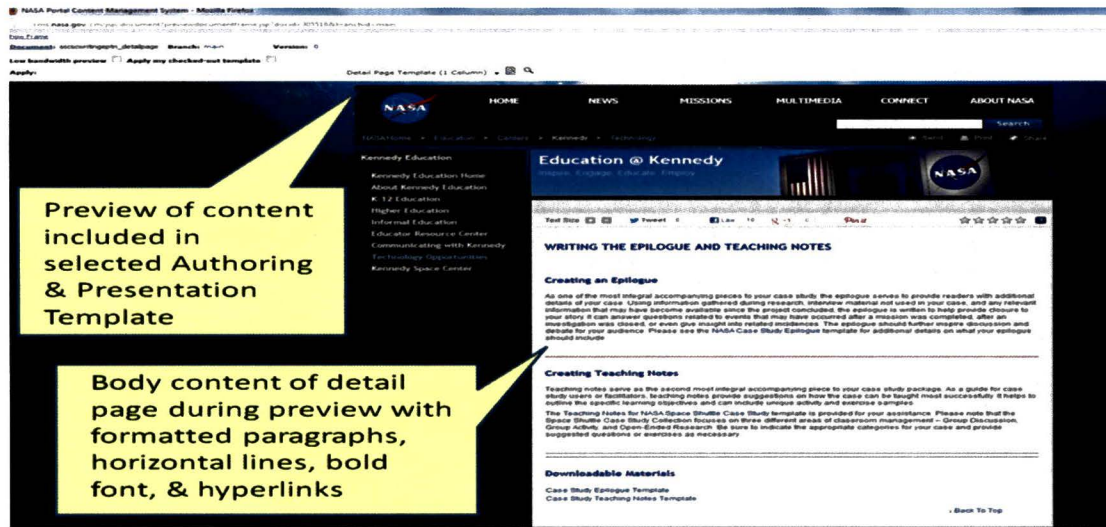
Figure 9. Preview of Detail Page. *Preview allows you to see the final layout of the detail page before it is published.*

B. Snippets

Snippets are another example of the type of document family possible within CMS. Similar to the creation of library item assets and detail page document assets, snippets also require property definitions before its body content can be created. However, unlike detail pages, only an authoring template is required. Presentation templates are often not used. Additionally, snippets allow fewer options within its content tab. The title and body content are required, but there are no areas for promotional content – allowing snippets to offer additional aesthetic options. For example, during promotion, or the view from a landing or home page, snippets allow for the display of a large portion of information to appear on the final page as opposed to the brief summary that is possible when using detail pages. Snippets are not constrained by the word limits of the promotional leader sentence but can be advertised using its entire body content.

Once detail pages and snippets have been previewed for proper layout and organization, they should be checked-in. Checking-in documents makes them non-editable and allows them to be embedded into other documents such as collections. All documents may easily be checked-out and edited as needed, however, if documents are not checked-in, they are not accessible or often do not show up during embedding selections.

IV.   Developing Collections

Within the framework of CMS, documents such as detail pages and snippets along with library items may be combined to create collections. Just like library item assets, detail page, and snippet document assets, the creation of a collection also requires property definitions. Collections require an asset name, authoring and presentation template, document type, and document family selection before content creation. With these options selected, the content tab of collections is accessible.

There are very noticeable differences between the content tabs of collections and other documents. In contrast to detail page and snippet documents, there is no body content section for collections. Because collections consist of a combination of documents, detail pages and snippets may be embedded within a collection using the asset references option. Numerous documents previously created and stored within the document repository may be browsed and selected from the appropriate category or folder to include within the collection. Only checked-in documents will be accessible during this process which is why it is important to preview and finalize all documents before collections are created.

Another difference between collections and other documents includes the template options. In addition to the authoring and presentation template selected during properties definition, collections also require an item presentation template. One of the most challenging aspects of collection creation is ensuring that the item presentation template (IPT) matches/agrees with the collection display size (CDS). For text and images to display properly, formatting options of these components must agree. For example, if the IPT has an option for blinds, or the display of multiple documents from the landing page, the CDS must also include a blinds option. If the IPT includes

a video or multimedia option, so must the CDS. Additionally, unlike with detail pages where content could be previewed and edited accordingly, preview is not an immediate option for collections. Users must check-in or make collections non-editable and develop a landing page in order for collections to be properly viewed. If content is not adequately shown during the preview of the landing page, the collection must be checked-out before modifications can be made. Once changes are complete, collections must be updated and checked-in again before previewing the landing page. No collections can be viewed from the landing page unless it is checked-in first.
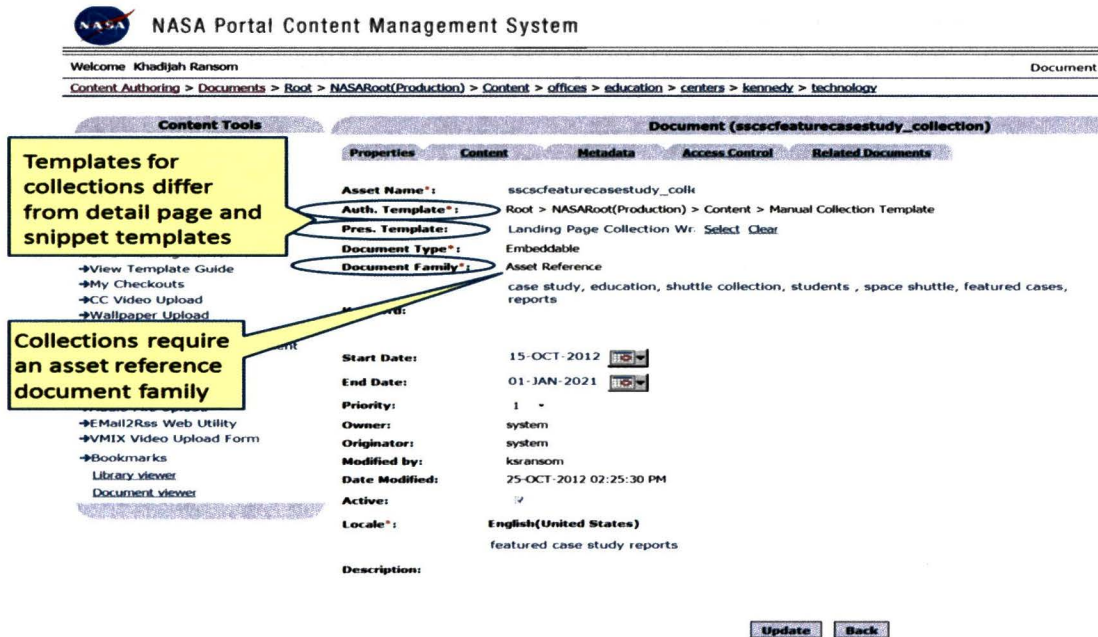

Figure 10. Collection Properties Creation. *Collections also require property definitions which include unique authoring and presentation templates and document family.*
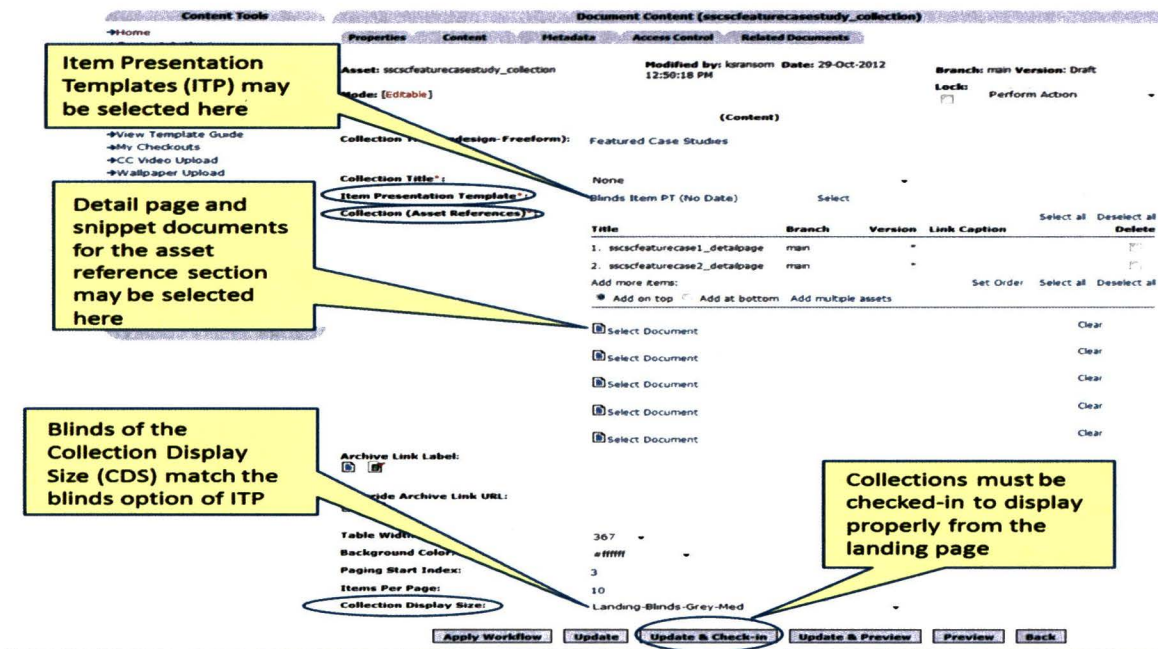

Figure 11. Collection Content Creation. *Collections require both an item presentation template and collection size display which must match in format. Documents or asset references may be uploaded from the document repository.*

V.   Developing the Landing Page

With detail page and snippet collections created, the next step in creating the Shuttle Case Study Collection website using CMS required developing a landing page. As one of the final steps of CMS website creation, landing pages allow users to combine and display collections. In contrast to other document and library item assets, website development typically requires a single landing page depending upon the size of the site or number of collections included. Landing pages can have up to twelve separate collections[1]. Of course, landing pages can consist of a combination of linked landing pages and collections, but for the purpose of the SCSC website, only a single landing page is currently required. As the case study database grows and more reports are contributed, options to expand to fit those needs exist.

To create a landing page, property definitions must also be completed as with other document assets and library item assets. Authoring and presentation templates must be selected, document type and document family have to be selected, and a description should be provided. Within a landing page's content area, document collections are uploaded - similar to the process for creating collections. Placement options for these collections include top, right, left, or center[1]. Additional promotional options are also available.

For the Shuttle Case Study Collection, numerous collections were required and included within the landing page. For example, to assist viewers of the SCSC website in browsing for case studies, there is a "Search Collection" collection which lists the case studies based on engineering modules or disciplines. A detail page was created for each engineering discipline in which links to each related case study were embedded within its body content. These separate detail pages for each discipline were then selected under the asset references option for collections. Other collections include "Contribute to the Collection", "Featured Case Studies", and "Quick Links". Each collection contains a different combination of detail pages and library items for display on the landing page. The one snippet document is also included within its own collection, "Introducing the Shuttle Case Study Collection." As previously addressed, using the snippet option allows for more content, including a large image, to be displayed from the landing page. It is not limited by the promotional leader sentence constraints.
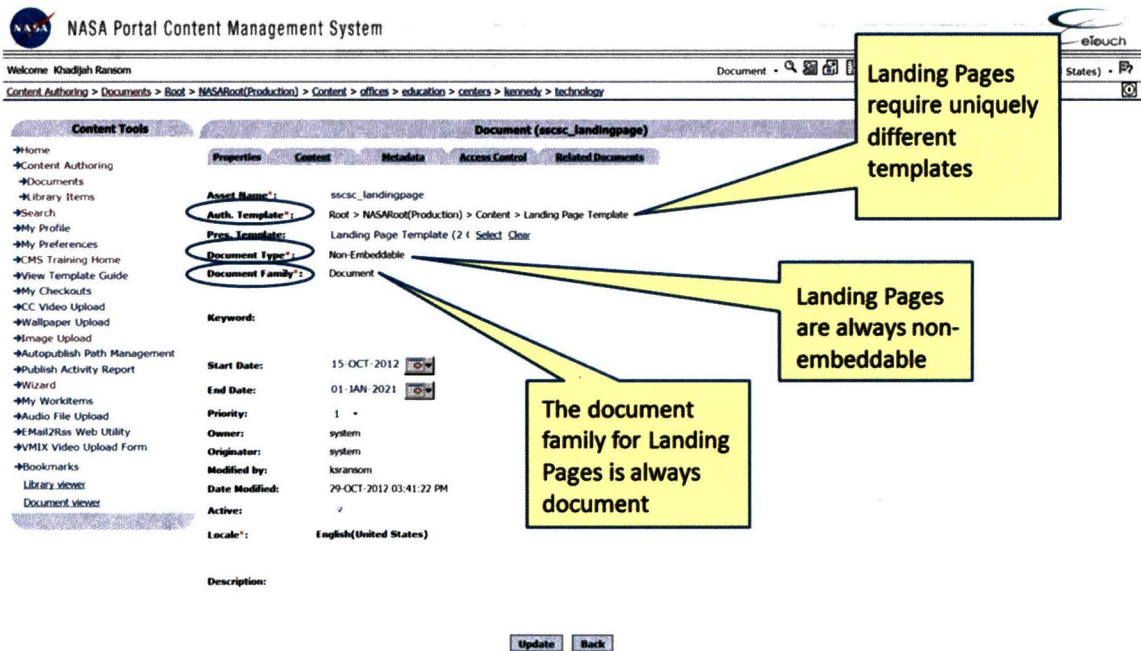

Figure 12. Landing Page Properties Creation. *Landing pages should always be created as non-embeddable documents.*
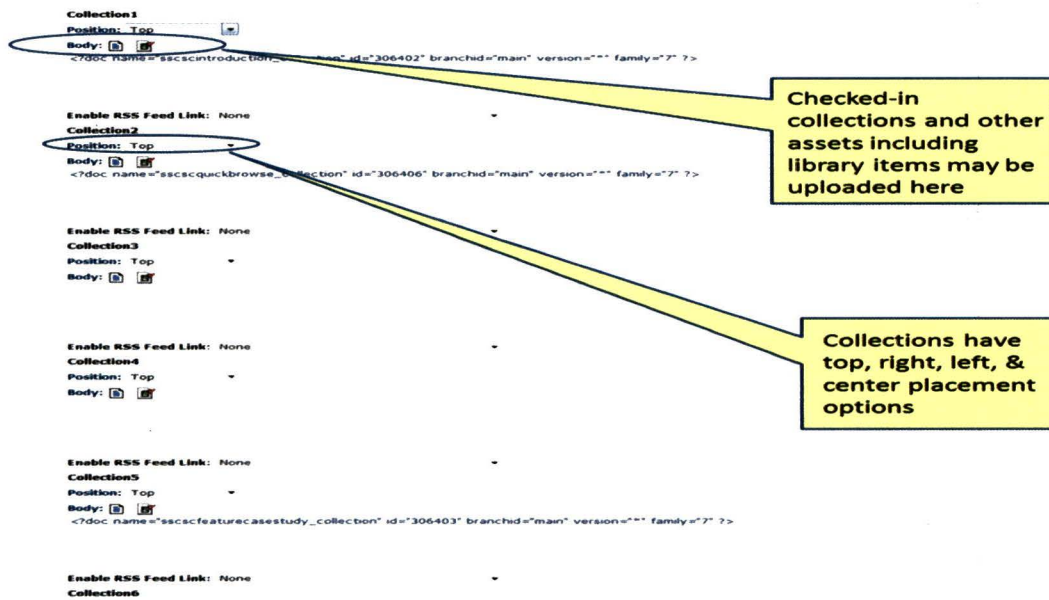
Figure 13. Landing Page Content Creation. *Up to 12 collections and other assets can be uploaded individually and positioned as desired within the landing page.*
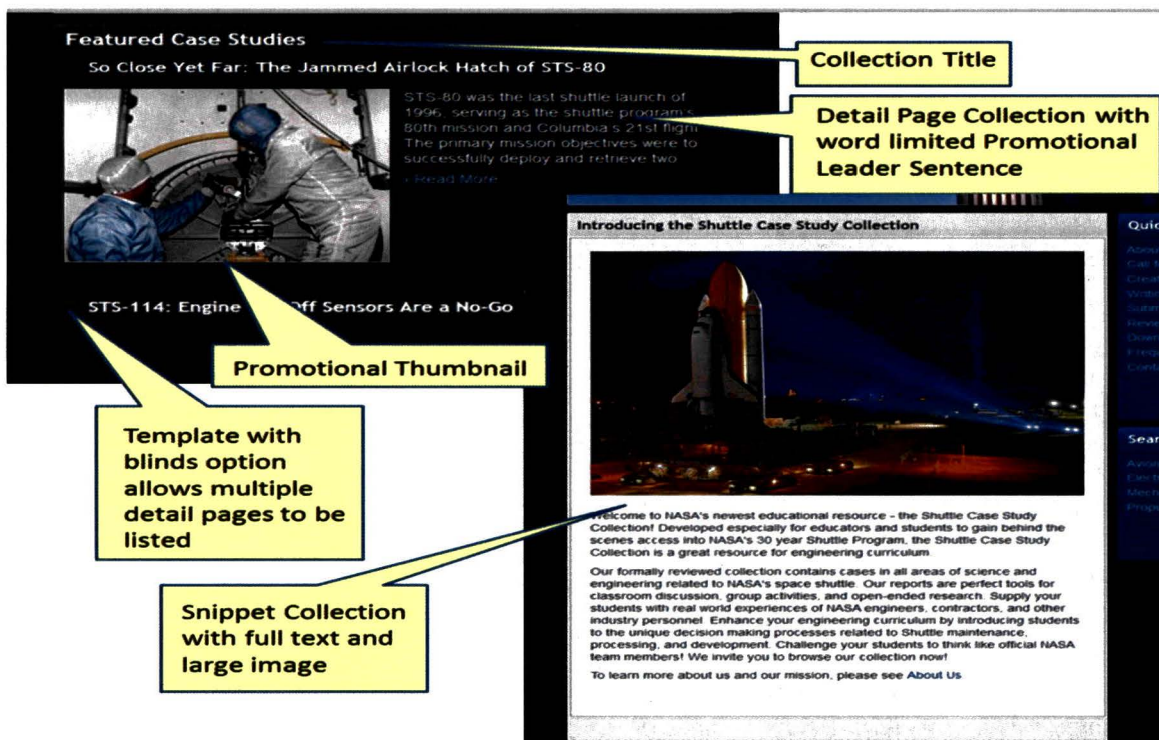

Figure 14. Detail Page Collection vs. Snippet Collection. *Promotions of collections with detail pages are word limited due to leader sentence constraints but snippets allow a larger amount of text and images to be shown directly from the landing page.*

Figure 15. Preview of Landing Page Draft. *The landing page is a collection of collections. Collections for SCSC include Introduction, Quick Links, Search, Featured Cases, Contribution, and Quick Browse. Banners and additional links are automatically added by selection of authoring and presentation templates.*

VI.   Conclusion

The Shuttle Case Study Collection is currently under development at John F. Kennedy Space Center. In an effort to provide high school and university level educators with Shuttle related, engineering case studies, the Shuttle Case Study Collection was developed in summer 2012. During fall 2012, development continued with the design and creation of its website to be housed on the NASA Portal. NASA's Content Management System was required to ensure that the site is consistent in appearance and delivery as other NASA websites. Within CMS, five steps were required for developing and publishing. These steps included creating library item assets, document assets, collections, landing pages, and applying the publish workflow. Progress has been successful and steady with over fifteen detail pages, six collections, and a draft landing page created within the first two months of the project. Currently, collections are still under development as template selections remain an issue. The final step of publishing is expected to be complete during spring 2013.

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