FUNCTIONAL AND NON-FUNCTIONAL REQUIREMENTS FOR EXHIBITION DIGITAL EXPERIENCES

Definitions for terms and acronyms appearing in this document:

- Android: mobile device operating system developed by Google
- API(s): Application programming interface
- App(s): Applications or Mobile App, depending on context. From Wikipedia: a self-contained program or piece of software designed to fulfill a particular purpose; an application, especially as downloaded by a user to a mobile device.
- CIS: Collections Information System
- CMS: Content Management System
- COPPA: Children's Online Privacy Protection Act
- COTR: Contracting Officer's Technical Representative (also known as COR, Contracting Officer's Representative)
- DAMS: Digital Asset Management System
- EDAN: Enterprise Digital Asset Network
- iOS: Apple mobile operating system used with Apple products such as the iPad, iPhone, etc.
- NASM: National Air and Space Museum
- OCIO: Smithsonian Office of the Chief Information Officer
- Products: refers to all final deliverables in the statement of work.
- QA: Quality Assurance.
- SI: Smithsonian Institution
- SOW: Statement of Work/Scope of Work
- SSID: Service Set Identifier. The name of a wireless local area network (WLAN)
- TMS: The Museum System (Gallery Systems software)
- UI: User Interface.
- UX/User Experience: quality user experience motivates people to use the product(s) to achieve their goals as well as NASM objectives.
- WSD: Smithsonian Web Services Division

SERVICES PROVIDED BY CONTRACTORS DEVELOPING IN-GALLERY DIGITAL EXPERIENCES:

In-Gallery digital experiences may include the following:

- Computer-based Interactives
- Digital walls or displays inside the gallery
- Kiosks, video displays, etc.
- Immersive experiences (simulators, etc.)

The following digital experiences are NOT developed as part of exhibition and in-gallery projects without prior coordination and written agreement with the Digital Experiences Department:

- Websites
- Mobile experiences (apps or web-based)
- Social Media engagement
- Digital displays outside the exhibition gallery (in main museum spaces)

Knowledge and Skills required:

- User-Experience Design (esp interactive/immersive experience design)
- Design Thinking and Visitor Evaluation
- UX for broad array of museum audiences in large space with short attention spans
- Visual Interface Design best practices for a variety of interfaces and interactive experiences (walls/tables, multi-touch, digital/physical display integration)
- Information Architecture
- Content Management System Design (Drupal)
- Data Management, including Personally Identifiable Information (Privacy, COPPA)
- Section 508 Accessibility requirements
- Data Transfer Protocols (JSON, APIs)
- Hardware specification, configuration, and testing
- Codebase management and version control
- Digital asset management (maintain all content and visual assets during project)
- Smithsonian software standards (Drupal, Adobe Air, HTML5, CSS, Windows)
- Other applicable federal regulations and guidelines

Services and deliverables for in-gallery experiences:

- Smithsonian Technical Review Board – Complete Smithsonian standard review process including initial project overview, network requirements, privacy review, security scanning and final testing/approval prior to launch.
- Conceptual Design – Facilitate conceptual design process with Museum staff and produce a written narrative of the interactive visitor experience for each discrete interactive including target audience, learning objectives, experience narrative, and required assets.
- Visitor Testing Plan – Identify visitor testing needs and produce a written plan for testing concepts with visitors and refining approach prior to implementation, including testing instruments and consideration of visitor privacy. Conduct visitor testing.
- Implementation Plan – Specify technical and functional requirements. Produce a written plan for implementation including technical specifications, data management, content, and phased implementation schedule with NASM review and approval stages.
- Maintenance Plan – a written plan for long-term maintenance of technical components, content, visitor information, design elements, and data management.
- Post-launch evaluation – testing after launch during 6-mo maintenance to ensure performance expectations are met and fix any bugs.

#	Type	Requirement	SI Comments
1	Access	Contractor shall design for accessibility through: • Use of highly accessible color palette, fonts, and user-interface design elements. • Text alternatives/ transcriptions for video and audio. Captioning	Contractor shall make good faith efforts to meet accessibility standards set forth in Section 508 of the Rehabilitation Act (Section 1194.22)

		on video. • Clear descriptive language for images, titles, buttons, navigation, etc. • Text shall employ adequate contrast and size for readability.	
2	Access	Smithsonian Institution logo and copyright, privacy, and terms of use as defined by Smithsonian shall appear within Products.	Appropriate placements per NASM guidelines.
3	Access	All Products shall be designed for simplicity and ease of use. All Products must load and render quickly for user.	Performance optimization & speed testing shall be part of test plans. High-quality image compression, background loading, tiling, caching, streaming content, small initial container file sizes, and other fast-loading techniques shall be employed to ensure fast download/loading of Products.
4	Access	Contractor will design for continuous availability of interactive experience.	For interactives that require remote resources or data connections, contractor shall plan for uninterrupted operations in the event of loss of connectivity.
5	Access	All audio and video shall display with user-controlled captioning/transcription.	Accessible to deaf and low-hearing visitors.
6	Design	Shall follow a consistent style and graphics standard across all Products.	Consistent design elements across museum interactives per NASM guidelines.
7	Design	Kiosk visual interface must support a minimum 1920 x 1080 target screen resolution.	Larger resolutions may be defined by custom experience.
8	Design	Visual interface will be designed and hardware selected to display object photography at high-definition standard or better.	Visual assets will be HD to 4K quality.
9	User Experience	Shall have a consistent user-experience and employ universal design best practices across all Products.	Consistent/seamless user-experience across all products.
10	User Experience	All Products shall be simple, intuitive, easy to use, offering a quick and user-friendly way to access information, utilize all features, or personalize/share content.	Interface shall not overwhelm users and shall minimize barriers to participation.
11	User Experience	All audio and video shall display with player controls (play, pause,	

		volume, fwd, rev, length)	
12	Content Management	Products shall leverage existing, central dataset/databases. All Products shall utilize the Museum's Collections Information System for object-related content unless otherwise approved by NASM. Products shall not access TMS directly, but rather extract from a standalone copy of the dataset(s) required to fully enable the Products and ensure optimal rendering and load times.	Content shall primarily be stored and maintained in TMS, DAMS, NASM web databases, or other existing Smithsonian systems to reduce duplication and ensure content can be maintained using existing workflows. Some content may require leveraging other applications and/or creation of a new custom database/CMS per mutual agreement with NASM.
13	Content Management	Contractor shall provide a SI hosted, browser-based, custom content management system (CMS) for NASM staff to edit, update and/or moderate all content that will not be managed via existing NASM/SI CMS.	
14	Content Management	CMS shall allow NASM staff to easily update, edit, delete or customize content at any time.	
15	Content Management – Analytics	Contractor will implement analytics on all products for easy review of evaluation metrics by NASM staff.	
16	Social Sharing	Any products that include sharing capabilities via social media and/or email shall be consistent with other interactives throughout the Museum and follow applicable NASM guidelines and design standards.	Social sharing must work as expected with appropriate images and metadata passed to social networks.
17	Email	Products that utilize e-mail must meet visitor privacy guidelines, target audiences 14 and older, and follow applicable NASM guidelines and design standards.	NASM e-mail templates and privacy process must be used.
18	Privacy	All content collection and social sharing features will incorporate privacy protection features, secure authentication using approved APIs, and display privacy notice to users.	Note that SI and COPPA privacy requirements can often dictate functional design.
19	Analytics	Contractor shall configure and implement analytics tracking on all products.	Utilize Google Analytics profile.
20	Performance	All content shall display error-free, e.g., without conflicts, overlapping, or other performance errors. Players/audio shall stop when users leave content view.	

21	Metadata	All visual assets shall appear with appropriate credits, sources, and ID#s	Metadata requirements (fields) to be provided by NASM
22	Plugins/APIs	Contractor shall obtain approval from SI for the use of any 3rd party software or APIs.	Should be used judiciously.
23	Uptime & Automated Restart	All products must function as expected and consistently for 10 hours per day, 364 days per year. Automated restart process and troubleshooting process must be enabled.	Exhibition interactives will be powered down each day. Specifications for power down/restart shall be included in documentation (See non-functional requirements).

C.3.3 NON-FUNCTIONAL REQUIREMENTS.

#	Type	Requirement	SI Comments
1	Policy Compliance	Work produced under this contract shall conform to the Smithsonian's Technology Reference Model (TRM), SD-940-01.	
2	Hosting	Content to be hosted outside exhibition space must be hosted on SI's centrally supported web infrastructure and conform to the technology standards of that infrastructure.	See infrastructure requirements
3	Upgrades	Contractor shall provide an upgrade plan for all elements. Plan must describe how the Products can be ported to upgraded platforms in future, and which elements are likely to be reusable or not in the long term.	
4	Documentation	The contractor shall provide design documentation and source files. • Final Style Guide (colors, fonts, etc.) • Experience map, flowcharts, wireframes, comps • Original raw design files	Smithsonian must have original source files and documentation sufficient to replicate or extend Products in the future.
5	Documentation	Contractor will provide technical documentation. • Technologies used, naming conventions, information management standards, accessibility / usability practices, search protocols/indexes, analytics, database tables, and any other functional considerations.	Smithsonian must have technical documentation sufficient to diagnose problems and make changes in the future.

#	Type	Requirement	SI Comments
6	Documentation	Contractor will provide user documentation • User documentation, how to use CMS to make content updates and modifications. This document should be targeted to staff maintaining content who do not have a technical background • Administrator documentation, how to add/edit users, adjust settings, or modify CMS.	Smithsonian staff must be able to easily update Products and manage the CMS over time.
7	Content	Contractor shall provide some content scripting (writing) for supplementary content.	NASM shall provide edited script content (text and visual assets). Contractor shall provide all other content with NASM guidance and approval.
8	Content	Contractor shall conduct final QA of all content (text, visual assets) for all Products, ensuring final version of content approved by NASM is in Gold product.	NASM will provide edited script and approval.
9	Testing/QA	The product shall be tested during, before and after deployment to verify that it functions as intended and that all requirements are met.	Mutually agreed testing and deployment schedule
10	Testing/QA	Master Test Plan (with discrete test plans for each individual Product) *To include:* • How testing will be used to ensure that the delivered product meets SI's requirements and functions as designed • What will be tested • How testing will be performed • Pass / fail criteria • Test deliverables (e.g. test report, including discrepancies identified during testing). • Test scripts (procedures) • Test environment (Initial testing will be performed by the Contractor at their facilities with a final report submitted to the Smithsonian. The same Master Test Plan will later be used to conduct acceptance testing at the Smithsonian facilities.)	The intent of this document is to describe and provide a test framework and set of test steps that can be re-executed to validate functionality and/or after changes are made and by SI, at it's option, for acceptance purposes. The Master Test Plan should include separate test plans that can be executed independently for mobile experience, website, Media Wall and interactive kiosks.

#	Type	Requirement	SI Comments
11	Testing/QA	Contractor shall provide a Mobile Test Plan and conduct iterative onsite testing of mobile user-experience, with a particular focus on: • location-awareness • data download/playback • connectivity over Smithsonian Wi-Fi provided free to visitors (currently SI-Visitor)	This testing must be initiated early in development to ensure time to address any issues.
12	Testing/QA	The contractor shall provide test results showing successful testing of all critical functionality and user-experience for all Products. • As a condition of Product acceptance, final Test Plan(s) with all elements successfully tested (pass rating) must be submitted one month prior to final product readiness review by Smithsonian Technical Review Board.	Iterative test reports and final Master Test reports, including discrepancies identified during testing
13	Performance Testing	Prior to acceptance, the parties shall stress load test the Products in accordance with the performance requirements set forth herein. Based on the results of such testing, and prior to production deployment, Contractor shall alter the Products to comply with the standards set forth herein. Contractor shall provide test results showing successful testing of all critical functionalities and outlining discrepancies identified during testing.	

#	Type	Requirement	SI Comments
14	Security Testing	Prior to acceptance, the Products shall be placed in a test environment where they can be subject to a series of web security tests under the direction of the Smithsonian OCIO. The Products will be scanned for vulnerabilities by the Smithsonian, and must pass security testing prior to acceptance. All high and medium vulnerabilities will need to be addressed, fixed, or mitigated to the satisfaction of the Smithsonian prior to production launch. Contractor should make a Contractor-hosted development site available to the Smithsonian for premigration security testing. After a successful Master Test of the Products, Contractor will install the final Products on the Smithsonian Web environment in the Smithsonian's Data Center. The Smithsonian will then conduct security testing, which shall include but not be limited to the top ten vulnerabilities identified on the OWASP site. Any problems will be reported to the Contractor for resolution. Acceptance testing re-executing the Master Test Plan will be performed by the Contractor and witnessed by the Smithsonian utilizing Smithsonian infrastructure and conducted in Smithsonian facilities. Acceptance testing will not begin until the Products have successfully passed the security testing. The tool Smithsonian currently uses is Cenzic Hailstorm, though other tools may also be used in consultation with Smithsonian. Time for scanning and remediation must be accounted for in the proposed Project schedule.	Where user authentication is part of a Product, an additional authentication review by OCIO is required to determine the appropriate authentication method.

#	Type	Requirement	SI Comments
15	Documentation	The contractor shall provide a system configuration document. • As a condition of acceptance of the Products, Contractor shall provide a system configuration report written for the target audience of administrator(s) for each digital element (mobile, website, Wall/Kiosks). The report should provide detailed information on how each Product is installed and configured on their respective platforms, including all required server or platforms settings, database connection methods / API / or other connection strings, and any initialization file(s) or other critical files.	Should any Product be moved to different hosting environment or file location in the current environment, it should be possible for a Smithsonian administrator, who is not familiar with the Product, to reference this document and have all the information necessary to get it up and running quickly.
16	Documentation	The contractor shall provide user documentation.	Detailed instructions for SI staff on how to access, add, delete, or modify content and/or otherwise modify the site(s). This document should be targeted to the unit site owner and it should be assumed that staff maintaining the content do not have a technical background
17	Source Files	The contractor shall provide all source files including high-resolution (non-derivative) master-image files and all software code to SI.	
18	Source Code	All code shall be annotated according to software engineering best practices.	
19	Code Review	During development of the Products, the Contractor shall make the source code for sections of the Products available by private repository through GitHub or a similar service. The Smithsonian will conduct regular reviews of the code and, as necessary, will provide feedback on corrective actions to be taken by the Contractor. All code must be commented appropriately to aid in review.	

#	Type	Requirement	SI Comments
20	Mobile App	Contractor shall design iOS App, Android App to adhere to applicable standards for mobile devices (tablet and smartphone platforms), including but not limited to: • Apple's standards for iOS apps: 1) iTunes human interface guidelines and 2) app store review guidelines • Google Play guidelines	
21	Mobile App	Contractor will handle all requirements, testing, and associated procedures for App store submissions. All submissions will be made under Smithsonian's account/name.	NASM will provide metadata.
22	Integration	Contractor is responsible for all integration and associated testing/quality assurance of all Products, including but not limited to: • Data / API / Connectivity / Database integration and testing. • Hardware / software configuration, installation, integration, and testing. • Uptime testing and diagnostics.	Data integration will involve consultation with NASM staff, discovery of systems, and recommendations on data storage/retrieval methods.
23	Accessibility	Reasonable effort shall be made to accommodate users with visual, hearing, or mobility impairments, and other disabilities.	Good faith effort should be made to meet all other accessibility standards set forth in Section 508 of the Rehabilitation Act (§ 1194.22) and the W3C priority 1, 2, and 3 checkpoints for web content accessibility. Smithsonian must approve any exceptions to Section 508 and W3C standards prior to development.

#	Type	Requirement	SI Comments
24	Training	Contractor will conduct training for Museum staff and subcontractors on operation, modification, testing, and maintenance of all Products.	Separate training sessions of approximately 1 hour each for: • Digital media operations, content maintenance. • Content expert CMS training. • Exhibits Tech staff kiosk/Wall hardware installation and hardware/software maintenance.
25	Evaluation & User-Testing	Contractor shall provide an iterative user-experience test plan for all Products. Test plan must include usability of all elements essential to meeting the user-experience goals of the Products.	This may be folded into the Master Test Plan, but must address user-experience, rather than purely technical elements. Plan shall include at least three user testing stages prior to Gold delivery and one post-launch testing session. See schedule.

#	Type	Requirement	SI Comments
26	Evaluation & User-Testing	Contractor will conduct iterative user-testing of all Products throughout the course of the project. This includes but is not limited to: • Developing all evaluation approaches and testing instruments with approval by NASM. • Analysis of all results and recommended changes to improve Product(s). • Examine visitor behavior and preferences for onsite, mobile, and online contexts. • Test usability and user-experience, particularly for mobile personalization, engagement/social sharing, and participatory/user-generated content features. • Evaluate social engagement using integration of 3rd party APIs (e.g., Twitter, Facebook, Instagram) • Test all user interfaces (Wall, Kiosk, Mobile, Website) with real visitors early in development. • Utilize feedback to iterate design with approval from NASM. • Vendor and Smithsonian will determine a mutually-agreed implementation of event-based metrics for visitor satisfaction per NASM requirements. • Results of evaluation and user-testing must be shared with Smithsonian. • Contractor may conduct evaluation and testing under supervision of Smithsonian staff, or Smithsonian staff can conduct visitor testing.	Contractor should review visitor evaluations and analysis completed to date. All testing instruments must comply with Smithsonian guidelines for collection of visitor information, which will be provided upon initiation of the project and through consultation with the team.
27	Data/Content Management Plan	Contractor shall provide a plan for how content will be leveraged from existing databases and any requirements for new databases/stores to enable optimal display of and maintenance of content for all Products.	Should specify integration with collections information database (TMS), DAMS, EDAN, or other existing systems.
28	Hardware Plan	Contractor will provide a hardware plan, detailing the specific hardware requirements for implementation of all Products by January, 2016.	Vendor will work with NASM to define hardware. NASM will purchase hardware

#	Type	Requirement	SI Comments
29	Marketing Plan	Contractor shall submit a marketing plan detailing methods and schedule for ensuring visitors become aware of and are motivated to utilize Milestones digital experience, in particular the mobile app. This plan may include taglines, exhibition signage, website promos, advertising concepts, suggestions for content to distribute to media (e.g., at the opening press event), or other creative marketing solutions.	Marketing plan should draw upon the results of visitor evaluations / user testing. Marketing plan will suggest ideas that may be folded into overall NASM Communication Plan for *Milestones*, pending review and acceptance by NASM Office of Communications.

C.3.4 Optional Services. The following optional services are highly desired for eventual implementation. Offerors shall address the following as optional features in their Technical Proposals and itemize separately in the Business Proposal. If not produced as part of this Project, these optional Products should be designed to scale and incorporate these features after launch. Contractor shall not begin work on any of these optional services until it has received approval from the Smithsonian Contracting Officer by written modification to this Contract. The Smithsonian reserves the exclusive right to extend the Contractor's services hereunder to include the following. Notwithstanding the foregoing, the Smithsonian may contract with any other entity of its choice to perform these optional services without restriction:

Option 1	Audio-Only Mobile Tour	Mobile experience option that provides visitors with an audio-description tour of the Museum. May use beacons to trigger audio.	Accessible to blind and low-vision visitors. Minimum viable product at launch, test with visitors after launch.
Option 2	Multiple Languages	Mobile and Web Experience shall be accessible in 10 languages: Spanish, French, Italian, German, Japanese, Chinese, Russian, Arabic, Portuguese, and Korean. Solution shall be scalable to easily edit/update translations or add additional languages.	May not use machine translation. Hybrid machine/crowd sourced model may be considered. Minimum viable product at launch, test with visitors after launch.
Option 3	11th Language	Mobile and Web experience shall offer a special custom-language tour 1 month after opening of *Milestones*.	Translations to be provided by guest expert. Think *Star Trek*
Option 4	Udvar-Hazy Center	Mobile app fully functional at the Steven F. Udvar-Hazy Center, including location-awareness/mapping and all features.	Launched 6 months after *Milestones* opening.
Option 5	In-App Games	In-App feature to download/rotate out mini-games that could be changed easily for new exhibitions, objects, or creative engagement activities.	Minimum viable product at launch, test with visitors after launch.
Option 6	Augmented Reality	AR feature to virtually see inside or pull apart objects to reveal interesting features. E.g. moving a mobile device camera over artwork in the *Milestones*	Minimum viable product at launch, test with visitors after launch.

		lobby reveals painting process, hidden details, or original drawings made by the artist.	

C.4 DELIVERABLES. Contractor shall provide the following deliverables hereunder for the Smithsonian's review and approval (the "Deliverables"). Unless otherwise noted, each of these Deliverables shall be submitted individually for each Product. The Deliverables shall be completed to the satisfaction of the Smithsonian in strict accordance with the project schedule set forth herein:

#	Deliverable	SI Comments
1	Project Schedule • Schedule must meet the goals of the project and key and/or non-negotiable deliverable dates as specified by NASM. Schedule must include timeframes for conceptual planning, system/data/asset planning, design, development, iterative user testing, alpha and best products, review and approval cycles, installation and testing, and closeout procedures (final testing/QA, plans & documentation, training, etc.)	Project Schedule is submitted with initial proposal.
2	Stakeholder & user interviews, discussions, brainstorming, and formative evaluation reports.	Conducted for conceptual design of Products, identify and refine user scenarios and user-experience plan.
3	**Conceptual Design** • Document describing the overall creative approach for all Products, including visitor/user experience briefs.	
4	**Implementation Plan** • Document detailing specifics of how each Product will be designed, built and deployed. Includes IA, wireframes, storyboards, design comps, system architecture/maps, APIs, collections database /data integration, technical specifications (hardware, software, 3rd party APIs or other tools, etc.) and user requirements (mobile devices/OS, web browsers, etc.).	Mobile Experience portion of plan must also include details regarding mobile feature set, location-awareness solution (WiFi, Bluetooth, Fingerprinting, etc.), user requirements (by mobile device/OS/Bluetooth hardware), App vs web-based delivery, methods for ensuring fast app downloads and optimal performance, and synch methodology with Wall kiosks. Include Schedule with review/approval stages and opportunities for user testing.
5	Functional Prototypes	Draft prototypes for internal

		review/approval and potential user testing.
6	User-Testing	Conduct multiple user-testing sessions as early as possible, no later than first functional prototypes, and at all successive stages.
7	Formal design submittals and reviews which shall be coordinated with SI	At various stages as mutually agreed in implementation plan. At least 7-10 business days for Smithsonian review/feedback/approval. (10 days for non-NASM stakeholder review or final review)
8	Early Alpha Mobile Experience	Early in the project, a functional alpha mobile experience should be submitted for testing with visitors. This should include location-awareness, mapping, user-contributed content features and related APIs.
9	Alpha Products	Alpha versions of all Products suitable for testing with visitors.
10	Beta Products	Beta versions of all Products suitable for testing with visitors.
11	Final "Gold" Products • Media Wall • Media Wall Kiosks • Mobile App • Website (Responsive) • Trophy Kiosk • Star Trek Kiosk	Delivered per mutually agreed schedule in accordance with exhibition installation schedule. Contractor will install in collaboration with NASM Exhibits Technology staff.
12	In-person meetings	At least three in-person meetings during project development.
13	Weekly project status reports with: • Accomplishments over last 2 weeks • Schedule status • Any risks or issues needing resolution • Progress of working meetings • Action items looking 2 weeks ahead	Contractor to meet with the SI project team (by phone or in person) every week Smithsonian uses Basecamp for online coordination.
14	Master Test Plan	
15	Hardware Plan	In coordinating with exhibition design team.
16	Test report (results) document showing successful testing of all critical functionality	
17	Complete copy of all finished Products, including all documentation, master images, audio and/or video, and source code.	GitHub and two copies on portable hard drives
18	System configuration document	

19	User documentation	User manual outlining the site purpose and structure and containing instructions for SI staff on how to maintain and update the content. Both hard copies and in MS Word format.
20	Training	User, Content/Administrator, Technical Configuration/IT, and Maintenance training sessions for NASM staff. Training sessions must be scheduled for each target audience.
21	Move Website(s) into production	Contractor transitions website to Smithsonian production environment and works with OCIO to complete performance and security testing.
22	Submit Mobile apps to App Stores	Contractor completes all necessary requirements, testing and procedures for submitting apps to App store for review. If rejected, Contractor addresses any issues and makes any required modifications. Apps are held for launch date specified by Smithsonian
23	Warranty	Contractor shall provide six months of technical assistance and troubleshooting to ensure product performance is maintained and continues to meet all requirements. Additional maintenance may be secured as a separate contract.
24	Mobile App Upgrades	Post-lauch, Contractor will provide two upgrades to mobile App upon identification of issues impacting user experience or significant hardware/software version releases, as mutually agreed. These upgrades may occur well beyond 6-month maintenance period but will be covered under original fixed-price contract.
25	Source Files/Source Code	Contractor shall provide Smithsonian with all source files for the Products including high-resolution (non-derivative) master-image files. Contractor shall also furnish Smithsonian with three (3) complete and accurate machine readable CD-ROM or DVD-ROM copies of: (i) the source code (including the compiler and assembler utilities, to the extent permitted by law), object code, machine language and assembly language forms of the Products; (ii) all original Adobe Photoshop, Adobe Illustrator or other graphics files, xthml,

		dhtml, CSS, cfm, html files, complete Java or Javascript code, Adobe Flash, director, animation or other scripts and production files, if any; and (iii) all other work product as defined herein. If Contractor corrects any defects in, or revises all or any portion of the Products Contractor shall simultaneously furnish Smithsonian with three (3) corrected or revised copies of the source code (including the compiler and assembler utilities, to the extent permitted by law), object code, machine language and assembly language forms of the Products along with three (3) machine readable CD-ROM or DVD-ROM copies of the Products.

C.5 ADDITIONAL INFORMATION AND REQUIREMENTS.

C. 5.1 Information on Smithsonian's Web Infrastructure: The Smithsonian has a production central web delivery infrastructure that is supported by the Office of the Chief Information Officer's Web Services Division (WSD) and provided to all SI museums / units. WSD supports over a hundred public websites and over 50 internal websites with a limited staff and budget and, therefore, must enforce a set of common infrastructure standards. Smithsonian's centrally-managed web infrastructures is Windows/ Intel-based and consists of staging / content management servers, SQL database servers, load-balanced web/web application servers, reporting, and search servers. Smithsonian does not have a centrally provided development environment. The Contractor is expected to develop the site(s) on and conduct beta testing within their own development environment. When beta testing is complete, the Contractor shall work with WSD to load the finished product into the production environment, then conduct final pre-launch testing to verify functionality before the site is made live (available to the intended end audience).

C.5.2 Staging/Content Management. SI uses a central staging – deployment model under which ALL site files are copied by the site manager to a staging / content management server that sits within SI's internal network. This internal "master" copy of the site is deployed to load-balanced sets of web / web application servers that reside within SI's DMZ. All file content must be deployed via this staging – deployment infrastructure. The Smithsonian uses Interwoven's TeamSite v. 6.5 web content management system that is centrally funded and supported. The National Air and Space Museum uses only the OpenDeploy function of TeamSite for staging to production server file transfers. NASM currently has several custom content administrator applications (built in ColdFusion) for remote content updating and dynamic display of database content. NASM also maintains Drupal-based sites that include content administration features. NASM plans to migrate its website entirely to Drupal by 2016. Contractor should be prepared to create websites and associated content updating solutions in Drupal or another CMS solution as mutually agreed with NASM and OCIO.

C.5.3 Databases. Smithsonian's web database server environment is made up primarily of Microsoft SQL Server 2000 Enterprise Edition servers running on Windows Server 2003 in a clustered environment. There are also several non-clustered MS SQL Server 2005 servers, also

running on Windows Server 2003. As existing database servers / clusters are replaced and new servers / clusters brought on line, they will be MS SQL Server 2005. The use of MS Access databases is not permitted within Smithsonian's web infrastructure, though Access may be used for development purposes before being migrated to SQL Server.

C.5.4 Web/Web Application Servers. SI's Web Services Division-supported web / web application servers are Windows 2008 Server Enterprise Edition running IIS 7. ASP / ASP.NET, and ActivePERL are supported. WSD supports both shared and dedicated hosting models. The majority of current SI sites reside on shared servers. SI desires to migrate to a situation where the sites of the larger organizations reside on dedicated servers. All web servers are deployed in load-balanced sets behind a pair of Cisco content switches. This means that each web site is duplicated and served by two or more servers. The content switch(es) provides load-balancing and session management so this is invisible to the end user. This configuration provides complete, live redundancy and allows a server to be taken off-line for maintenance without bringing the site down. Should site traffic increase to a point where performance is impacted, additional servers can be added to the set to handle the additional load.

(i.) No direct logon on to production web servers is permitted. All file changes must be deployed via the staging infrastructure. SI's Intranet websites are served from servers located within a DMZ subnet that are logically and physically separate from SI's Intranet web servers.

ColdFusion 9 is also supported within the above infrastructure, which is currently in use by the National Air and Space Museum, but is not for use for this project.

(ii.) Smithsonian OCIO also has a central Drupal server environment that hosts several Drupal-based Smithsonian online exhibitions. Staging/QA for this Drupal environment was recently implemented. The National Air and Space Museum is developing the Baron Hilton Pioneers of Flight Gallery website in Drupal. The Drupal LAMP hosting environment is comprised of Read Hat Enterprise Linux 6.4, Apache 2.2, MySQL 5.6 enterprise-commercial and PHP 5.3. Drupal 7 may be used and custom modules must be reviewed and approved by OCIO. Further Drupal requirements are available upon request from OCIO.

(iii.) Any applications developed with a web-based technology and intended for use on the NASM public website must be developed with SEO and accessibility (section 508 and mobile) best practices. HTML applications must use HTML5 and CSS 3.

C.5.5 Collections Information System (TMS) and Related Systems. NASM's primary Collections Information System is The Museum System (TMS). All information related to the Museum's objects is stored in TMS, which is maintained by the Museum's Registrar in the Collections Department. Content stored in TMS is regularly updated by curatorial and collections staff. Object records that are marked in TMS for public access automatically appear on the Museum's website where a subset of object data is displayed: http://airandspace.si.edu/collections/

(i.) Smithsonian has a central Digital Asset Management System. Specifications for this system are available upon request. EDAN is a Smithsonian centrally maintained metadata repository and web service layer that indexes a growing repository of 7.5 million Smithsonian records (primarily collections items), with 1.2 million including images. It consists of a SOLR-LUCENE index and set of web services, including a metadata delivery service (MDS), which can be used for queries and the return of results; a tag service that can be used to supplement data for an object record (anything from labels to keywords); a myList service; and an image delivery service (IDS) that

can be used to perform on-the-fly image resizing (using images from any SI image server) and also includes a skinnable viewer with zoom functionality. EDAN data can be retrieved using JSON calls or XML (JSON generally preferred for performance reasons). The type of data within EDAN can be viewed through the http://collections.si.edu website (which also makes use of the MDS and IDS). A basic Drupal module for calling data from EDAN can be made available for customization.

1.1.1 C.5.6 Analytics and Reporting. Smithsonian provides website statistics using WebTrends SmartSource Data Collector (SDC) tags. NASM also uses Google Analytics, which is recommended for more detailed analysis and tracking of user behavior on websites and mobile applications.

1.1.2 C.5.7 Search. Smithsonian uses a Google Enterprise Search Appliance cluster that is centrally maintained by SI's Web Services Division (WSD) for search within SI public websites. This Google appliance is made available to all SI unit public web sites for setup of site-specific collections / sub-collections (views) using normal crawls.

C.5.8 Exhibition Electronic Displays and Computer Interactives. Computer-based interactive hardware in the Museum exhibition spaces are managed and maintained by NASM Exhibits Technology. NASM currently houses all computer hardware running exhibition interactives in a controlled basement facility, separated physically from monitors and touchscreens on the Museum floor. Exhibition computers are restarted daily and run continuously for 8 hours a day, 364 days a year. All software developed for exhibition display must be configured to enable standalone startup and remote management, without manual steps required on a daily basis. All exhibition computers are currently Windows 7. Exhibition computers will be configured to automatically start the interactive application after the OS has loaded.
Other current systems and recommendations include: Video/touchscreen extenders: Magenta, Max resolution-1920x1080, RS 232 touchscreen (no USB), VGA in/out, capable of extending 600 feet; Media Wall should use distributed power and signal (all processing and power supplies are remote), capable of extending 600 feet; Computers: rack mounted, dual video card (two VGA out); Monitors: VGA in, 9-pin RS232 touchscreen, projected capacitance or sound acoustic wave, touchscreen is glass, built in speakers with audio control.

C.5.9 Digital Video SI/NASM does not currently have a standard video hosting solution. NASM primarily uses YouTube to host online video. YouTube may be used, or other options for optimal video hosting may be explored. Digital video for this Project will be produced through a separate contract.

C.6 ACCESS TO SMITHSONIAN'S COMPUTER/DATA NETWORK. If deemed appropriate by the Smithsonian, Contractor personnel and/or representatives may be given a network logon account and access to the Smithsonian's computer/data network. In order to gain access to Smithsonian's computer network, Contractor personnel will be required to read Smithsonian Directive 931 "Use of Computers and Networks", the "Rules of the Road for Users of Smithsonian Computers and Networks" (which are derived from SD 931), and sign an affirmation that they agree to comply with the provisions of SD 931, to act in a responsible manner, and to respect and maintain the security of all systems to which they have access. All Contractor personnel with network access are required to complete a short on-line computer security training program annually. Contractor personnel with Smithsonian network access are required to obtain a Smithsonian Security Credential (badge).

C.7 SECURITY CREDENTIALS. Contractor shall abide by the rules, regulations and security

requirements established by the Smithsonian. If deemed appropriate by the Smithsonian, Contractor personnel and/or representatives may be issued passes or visitor identification enabling such persons to enter and access Smithsonian properties and/or the Smithsonian's computer network. Such passes or other identification will be issued only to persons meeting reasonable security criteria applicable to the properties and/or tasks being performed. The Smithsonian reserves the right to fingerprint Contractors or other persons obtaining security credentials (i.e., badges) and/or conduct background checks for security purposes. Smithsonian shall be entitled, in its sole discretion and without liability, to immediately remove or terminate the access rights of any of Contractor's personnel and/or representatives. Smithsonian will promptly notify Contractor of any such removal or termination and the basis for the revocation of access rights. Such pass or identification cards shall be surrendered immediately at any time upon demand by the Smithsonian; and also upon the expiration or termination of this Contract.

C.8 ADDITIONAL PROJECT MANAGEMENT AND GENERAL REQUIREMENTS.

C.8.1 The Contractor shall designate a project manager who will coordinate with NASM, schedule and document all meetings, track the development process, oversee all requested changes, provide quality control, and act as a liaison with NASM and Smithsonian stakeholders. Key to the success of this Project will be the Contractor's assignment of an experienced and dedicated Project Manager.

C.8.2 During the performance of the work, the Contractor shall keep in close liaison with the Smithsonian COTR as designated in Section G.3 below. The Contractor shall also keep written records of all significant telephone conversations, meetings, or discussions between the Contractor, and any organization contacted concerning this project.

C.8.3 Except as otherwise provided herein, the Smithsonian staff will only be present to the extent necessary to provide general Project coordination, and to observe and review the progress of the Project.

C.8.4 Smithsonian reviews and approval shall not relieve the Contractor of professional liability or conformance with the Scope of Work. The Contractor shall be solely responsible for the professional quality, technical accuracy and all facets of the Project. This responsibility remains with the Contractor until the entire Project has been has been completed, ensuring thereby that all documents have been submitted, and all claims are resolved.

C.8.5 Contractor must make its staff available for all required team meetings, design reviews, and inspections.

C.8.6 Contractor must immediately notify the COTR and the Smithsonian Contracting Officer of any problem, unexpected occurrence, or delay in the process of the Contracted work.

C.8.7 The Contractor and the COTR will jointly present briefings to the Smithsonian Technical Review Board (TRB): Requirements Review, System Design Review and Production Readiness Review. In coordination with the Smithsonian COTR, the Contractor will revise the requirements as requested by the TRB.

C.8.8 Contractor must work cooperatively with the Project team and collaborating Smithsonian staff whose activities may be functioning in concert with the efforts of the assigned project in order to ensure that all elements of the projects provided work together efficiently and safely with all components compiled, created, fabricated and/or installed by the Contractor.

C.8.9 Contractor key personnel, as set forth in Section G.10 below, shall be available during normal business hours (8:30 a.m. – 5:30 p.m. ET) for support and inquiries during production and

launch. On occasion it may be necessary to work outside normal business hours. All U.S. federal holidays shall be observed.

C.9 DEPLOYMENT AND HOSTING. Upon Smithsonian Acceptance, Contractor shall promptly deploy the Products to the Smithsonian OCIO server and supporting environment. Contractor represents and warrants that the Products shall be designed, developed, and implemented so that the Products, when operated on the Smithsonian server, will function and perform in accordance with the requirements set forth herein. Contractor shall, at no cost to Smithsonian, promptly provide any updates, revisions, and replacements necessary for the Products to function and perform in accordance with requirements of this Contract. Unless overriding architectural or functionality justifications exist, the Products shall be hosted on the Smithsonian's own infrastructure within its own datacenter. Justification and waiver and a written amendment hereto signed by the Smithsonian Contracting Officer must be obtained for non-Smithsonian datacenter hosting.

C.10 PRODUCT GUIDELINES. In addition to other requirements contained herein, Contractor shall use its best efforts to ensure that the Products conform to the following guidelines:

(i.) Artistic Control. Smithsonian shall have exclusive artistic and editorial control over the Products including without limitation, integration of all Content; the design; and the look and feel of the Products. Except as provided herein, Contractor shall not publish, or otherwise display the Products or any portion thereof without Smithsonian's prior written approval.

(ii.) Purpose. The Products shall be designed to attract repeat user visits and promote the most current content, assets, services, goods, and properties identified by the Smithsonian.

(iii.) Limitations. Contractor shall not, without Smithsonian's prior written consent, permit the Products to contain or include: (i) software that is downloadable by users (other than HTML and other software used to format and display HTML documents or World Wide Web Pages, and elements embedded therein, such as sounds, images, audiovisual clips, which elements Smithsonian acknowledges will be downloadable by users); (ii) HTTP links to websites other than a Smithsonian website; (iii) materials received and/or licensed from third parties; or (iv) the capability to sell products or services directly through the Products.

(iv.) Quality Control. Throughout the Contract Term, Contractor shall adopt a quality assurance program to monitor and evaluate the quality and effectiveness of the Products; and Contractor will cooperate with the Smithsonian in taking steps to resolve any quality or performance issues arising in connection with the Products.

C.12 APPLICABILITY OF SMITHSONIAN INSTITUTION DIRECTIVES AND POLICY. All services and the Products delivered hereunder shall be in full compliance with and conform to all Smithsonian Directives and Policies including without limitation the following:

- Smithsonian Directive (SD) 950 – Web Management
- IT-940-01 Technical Reference Model
- IT-950-TN01 – Web Copyright & Privacy Notices
- IT-950-TN02 – Internet Domain Names
- IT-950-TN03 – Public FTP Server Accounts
- IT-950-TN04- Public Website & Web-Based Application Developments
- SD 940 Acquisition of Information Technology Products
- SD 184 Smithsonian Social Media Policy

C.13 CORRELATION AND INTENT. Any omissions herein of such words and phrases as "the Contractor shall", "the Contractor shall", "shall be", "shall consist of", "in accordance with", "shall", "and", "the", etc., are intentional. Such words and phrases shall be supplied by implication. Whenever the words "necessary", "proper", or words of like effect are used herein with respect to the extent, conduct, or character of work required, they shall mean that the said work shall be carried to the extent, must be conducted in a manner, or be of a character that is "necessary" or "proper" under the circumstances, in the opinion of the Contracting Officer. The Contracting Officer's judgment in such matters shall be considered final.