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REMEMBERING THE GOOD FIGHT

The National World War II Museum preserves the voices of the Greatest Generation

By: Judith Rubin

Since opening in November 2009, the National World War II Museum expansion in New Orleans has drawn glowing acclaim and healthy visitor numbers. The new, 70,000-sq.-ft., $60-million complex's venues are The Solomon Victory Theatre, Stage Door Canteen, and The American Sector restaurant. Voorsanger Mathes, LLC was the architect for this first phase of a $300-million project to develop the museum's six-acre campus, set for completion in 2015. The grand-opening celebration was presented by Satterfield & Pontikes Construction, general contractor for the project, and included a retrospective honoring the museum's founder, the noted historian Stephen E. Ambrose.

The central feature of the redeveloped museum is the 250-seat Solomon Victory Theatre, the home of *Beyond All Boundaries*, a 45-minute, 4D multimedia show that tells the story of America's experience of the war and endeavors to preserve the voices of WWII veterans and eyewitnesses. "It was in one of our several iterations when we sat down with Tom Hanks and he suggested, 'Could we tell this in the voices of the people who were there?'" recalls show producer and creative director, Phil Hettema.

Beyond All Boundaries was conceived, designed, and produced by The Hettema Group, with Hettema leading the creative team, and Anthony Pruett as senior project director, driving the production effort. George Wiktor, now an independent, was with Hettema throughout the project, on production development. Tom Hanks was executive producer, and the president and CEO of the museum, Dr. Gordon H. "Nick" Mueller, was producer. The team also included Chris Ellis (writer); Mousetrappe (director David Briggs and media designer Daren Ulmer); Doug Yellin, media producer for The Hettema Group; It's Alive Co. (Bob Chambers, Susan Cummings, and Rob Palmer); LA ProPoint (show action equipment); Electrosonic (AV design, show control, and integration); Visual Terrain (lighting design); Bandit Lites (lighting supply and integration); Audio By the Bay (sound design and music production); Bruce Broughton (original music); Timothy Williams (music scoring and conducting); John Kasperowicz AIA (theatre design); Daniel Ionazzi (scene design); AES (scenic fabrication); Judd Nissen (site project

Photos: Courtesy of the National World War II Museum

Above: The exterior of the complex housing the Solomon Victory Theatre, Stage Door Canteen, and American Sector restaurant.
Below: The interior of the Solomon Victory Theatre.

coordinator); and Rando Productions (special effects). With Hanks doubling as narrator, the show features an all-star voice cast including Kevin Bacon, Patricia Clarkson, Blythe Danner, John Goodman, Neil Patrick Harris, and Gary Sinise.

The theatre's raked seating is cocooned snugly within the curve of a projection scrim that is 115' wide by 28' tall. Giving depth to the illusion are special effects that work in concert with the action on-screen and a host of physical props that are revealed by lighting when they fly overhead or emerge from the pit. Additional projections appear on Christie DLP DS-10K-M secondary screens about 25' behind the main scrim and three smaller Christie DLP HD-10K-M screens in front that raise and lower from the pit. These three hard-surface panel screens allow for directed focus on archival images, and provide a contrast to the large scale of the massive main screen. Six sections of black velour provide masking. (Soft goods were furnished by Rose Brand).

Theatrical license and placemaking

"The dramatic scale of audience to screen was part of Phil Hettema's core concept for putting people in the middle of the experience," says Daren Ulmer. "Theatrical scenic and set pieces were part of the concept, so we took theatrical license. We approached each scene thinking what we'd do in a traditional theatre environment rather than a film documentary. We considered the elements of the film as cinematic representations of theatrical elements, such as scenic, lighting, and performers, and we thought about the images as being projected beyond the plane of the screen—as if the screen were a proscenium. We went for a painterly, rather than photorealistic, look. Performers were shot on film and composited into a scene, most often at a 1:1 scale, to appear life-sized. At the same time, we were not constrained by the physics of actual theatre."

Consultant Yael Pardess was tapped to art-direct the movie. "Yael brought a theatrical sensibility to the design," says Ulmer. "Her designs brought a great color palette, perspective, and POV that had its basis in dimensional physical space rather than a 2D screen."

The Normandy D-Day landing is the most elaborately realized battle scene. The film imagery interplays with physical set pieces: five tank traps rising up from the pit. Other sequences are fully CG-animated, the biggest of which depicts US B29s firebombing Japan from the viewpoint of someone inside the plane, accompanied by Jesse Eisenberg's reading of a graphic quote from a veteran who had been there. "We were extremely cautious to be absolutely true to the history and the facts," notes Ulmer. "Everything was vetted by historians, and the 4D type tools that we used were applied in moderation, to create setting and emotion and enhance the theatrical suspension of disbelief. It wasn't a 'ride,' it was placemaking."

Risky from the start

"Getting the facility right as much as possible the first time around is my specialty," says Bob Chambers. "We technically managed all the disciplines it took to put the hardware in the building, and we advised on what the building had to have to support that hardware in terms of architectural, structural, mechanical, electrical, and plumbing."

"This thing was a risk-taker from the beginning," adds Chambers, "but I think that's what drew the client to Phil. It was an over-the-top story and they wanted the show to be hyperreal in an interpretive manner. The creative challenge is what fires up guys like Phil—and not every project owner wants to take that kind of risk."

In the early stage of schematic, the entire project was put on hold due to Hurricane Katrina. "We didn't know what was going to happen, but, within six months of Katrina, George Wiktor and I were on a plane back to New Orleans and the client was ready to fast-track. The building and attraction were coming together at the same time, and that's the part I love the most, because it's the hardest thing to do."

The angled back wall of the theatre curtailed an already limited area for equipment and amenities. "The women's bathroom is tucked under there, and a storage area," notes Chambers. "Acoustical treatment plus concrete and drywall made it 2' thick—it must be the best-insulated women's bathroom in history."

The original design included a basement that would house gear and set pieces. "Phil wanted elements to come out from below," says Chambers. "The basement evolved into a concrete pit, a crescent shaped crevice 9' at the widest part, about 20' deep and 60' across—nearly as wide as the entire seating area. Watching the crew dig a slot of that size in New Orleans silt was fascinating—it's like digging in quicksand."

For a dramatic, cost-effective smoke effect, "I devised a modification of a fairly standard gag," relates Chambers, "where you basically have a box that you fill up with mist or steam or smoke, and use coppus nozzles to blow it out when you need it. We had Rando build five boxes 8' wide, 16' tall, and 1' deep. You have to be careful when you tune it, because even quick-dissipating smoke doesn't vanish nearly as fast as liquid nitrogen or steam. The first time we ran it, we filled the entire theatre with smoke that lingered for an hour and a half."

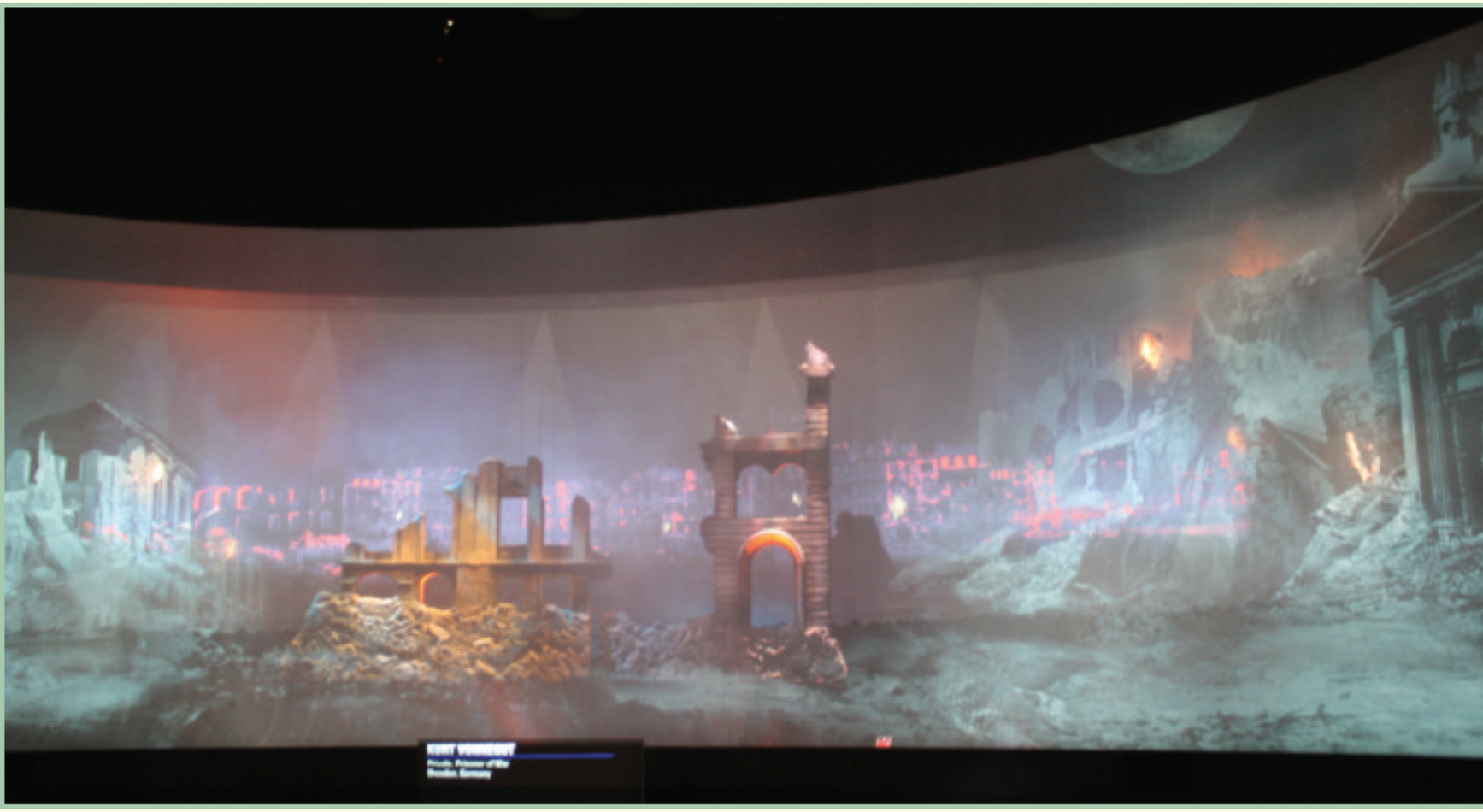
The two-gallon bucket

LA ProPoint's scope of work included show action equipment, theatrical rigging, and scenic elements. Andy Hanlen was senior project manager and Brad Powers was technical manager.

Custom-made pieces include the B-17 bomber nose section for the scene in which the front fuselage of the plane travels down from the catwalk into the theatre

Photos: Courtesy of Electrosonic

Above and below: Scenes from *Beyond All Boundaries.*



space. “The scene is a big factory,” explains Hanlen. “A bomber is sitting there with no nose, and a worker is waving to a crane to bring in the nose cone. The prop comes in and mates with the screen. It was a challenge to go in smoothly and make the right connection with no gap showing. The B-17 is stored in the ceiling downstage from the proscenium overhang. It couldn’t drop directly onto position—we had to bring it in horizontally at the same time, so we made a carriage up in the loft that contains an SEW-Eurodrive motor with a custom-machined winch and cable drum—a nice piece of equipment designed by Eric Gill. The B-17 nose cone is suspended from cables and on a track. As it comes down, it is also moving upstage, 4' down to 1' upstage. The same motor that moves it forward and back drives the winch, too.”

LA ProPoint also provided the tank trap props for the Normandy beach scene. “They represented steel obstacles to tanks,” says Hanlen. “During the D-Day sequence, 3D tank traps rise up from the pit on mast lifts—like popsicles on sticks—by way of a motorized chain drive. They lift into view in front of the scrim while the mechanism remains in the pit. At the same time, behind the scrim, 2D ones go up and down on a pneumatic, counterweighted teeter-totter mechanism. They sit onstage at right angles to the audience, behind a 6' wall.”

Serapid provided the custom lift that drives an Auschwitz guard tower scenic element that rises out of the pit in front of the scrim, and others that raise and lower the Tokyo skyline scenic profiles behind the scrim. “We provided the complete show action equipment and rigging systems, including the control subsystems for all of our elements,” notes Hanlen. The controllers, both hardware and software, were designed for LA ProPoint by Duncan McKenzie, of Proskenion Design. The subsystem control/motor control cabinets were built by Advanced Entertainment Technology. “Each of the cabinets has multiple PLC, one for each specific show action equipment or rigging element—27 separate items,” says Hanlen. “We contracted with J.R. Clancy to build lineshaft winch machines for the blackout curtains and moving scrims.”

Soft goods, including blackouts, moving scrims, the huge curved projection scrim, and the main curtains, were provided by Rose Brand. In addition to overseeing the work with J.R. Clancy on the rigging elements, Brad Powers planned and detailed the complicated layout and placement of all elements in the space available. “The quantity of gear squeezed down into the pit, onto the stage area between the scrim and the back wall, and into the overhead spaces, created a challenge similar to trying to cram 10 gallons worth of stuff into a five-gallon bucket—or maybe a two-gallon bucket,” says Hanlen. “Brad’s experience and attention to detail made him very good at making every element fit as required, move as needed, and not crash into other elements or the walls.”

LA ProPoint was involved on the project a couple of years before actually contracting to Hettema, helping set preliminary budgets, talk over preliminary designs, and ultimately sell the project to the museum. “Then we moved right into production,” says Hanlen, who notes that several others on the creative team also played similar pre-contract roles. “This level of prep work, ‘on spec’ before the job is actually awarded, is a risk, but you have to be open to doing it if the situation calls for it. I give a lot of credit to the Hettema Group for managing the show vendors—they did a good job from Anthony on down.”

J.R. Clancy’s work on the theatre was project-managed first by Bridget Cox and then by Patrick Finn. “We manufactured seven curved lineshaft hoists for LA ProPoint,” say Finn. “They lifted the scrim and some other

The guard tower set piece.

Hard surface walls rise up to show additional media and subtitles.

drapery using a yo-yo drum, where the cable piles up onto itself. The hoists are variable speed, with 0-180' per minute capability and a total travel of 36'. The push-button controls have limit switches for them to slow down as they go, for a graceful start and stop. These were relatively short, consisting of three drums, each connected with drive shafts. In between two of the drums was the motor which drove the unit, and below that were curved battens for the drapery."

AV, integration, and control

The project manager for Electrosonic was Steve Calver, working with John Bush (primary programmer and commissioning engineer), John Notarnicola (engineering design and projection development), and Nir Elnekave (field projection).

Beyond All Boundaries is sourced from five dual-channel Electrosonic JPEG-2000 players that provide ten channels of 24p HD. For the six-minute pre-show, which sets the stage with a look at life in prewar America, eight Panasonic TH-58PF10UK plasma monitors are driven by eight Electrosonic MPEG2 HD video players. In the control booth at the back of the house live the primary video projectors—three Christie Roadster S+20k DLPs providing the imagery for the main scrim and equipment racks. "The three 20K projectors are aligned to have a singular focal point of lensing," says Calver. "The reason being, we tried to achieve edge-blending not only on the front scrim, but also on the concentric screen 25' behind it. We had to basically stack them, two shooting left and right in front of each other, with the center projector above. It was necessary to hold the edge-blend on the front scrim as well as the rear scrim, because sometimes the image is shooting right through the scrim onto other things. This created some interesting geometry exercises in the early design phase."

The upstage projection system consists of five Christie DS+10K-M DLPs, positioned back above the primary scrim, shooting down to the secondary screen. "These images are edge-butted using the Christie warping software. One final projector—a Christie HD10K M DLP—lives back of house under the catwalks. It shoots on the plinths—the hard surface walls that raise and lower from the pit. These surfaces are continually going up and down, and are used to add video media and subtitles. The unique combination of a see-through scrim with animatronic sets moving up and down, both in front of and behind, along with additional projections on the rear screen, really provides an illusion of depth for the show."

Ensuring alignment and the desired dramatic pacing in an environment of tricky geometry, special effects, and show action equipment, requires a lot of work. "The programming effort was significant," recalls Calver. "Once all of the various show action, lighting, and effects systems had been rough-programmed, the overall timing of all the elements had to be tweaked to match the show content. To ensure precisions, Daren Ulmer of Mousetrappe set up a mini-studio in the theatre to create modifications to ensure the movement and action of physical objects matched the scale, speed, alignment, and perspective of the video content. New content was rendered straight into the Electrosonic JPEG 2000 encoding farm, managed by Tom Brighton, to minimize transfer time so that updated scenes could be brought into the show as quickly as possible. This process went on almost continuously while John Bush, Electrosonic's Medialon programmer, managed show playback and continued to fine-tune all queue timings. This programming effort required the constant involvement of the Hettema Group, L.A. ProPoint, Rando, Bandit, and Electrosonic. The programming task was intensive and was accomplished with an abundance of cooperation and coordination from everyone involved."

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A Medialon GD-SCMIII show control machine, operating Show Manager V5 software, controls the production. The Medialon product generates master SMPTE time code and a Brainstorm time code distribution amp distributes it to the lighting control system and to a MOTU Timepiece AV synchronizer. "There is only one show an hour," says Calver, "so it didn't need to be programmed too tightly. On the touch-panel console, the operator hits Go, the doors open automatically, visitors are seated, the operator hits Go Again, and the show runs by itself. Discrete inputs/outputs interface with the show action equipment, projectors, video players, and audio systems on network TCP/IP or RS 232 protocols, via Ethernet. The lighting system communicates on DMX, tied in via time code, and distributes lighting cues and DMX systems to the fixtures. In our control system, we built touch panels that allow access for lighting maintenance, lamp checks, and to test certain effects equipment and show action equipment. It was a matter of building the components into the system to allow access discreetly in a maintenance type of mode as well as trigger them in time-code fashion. We interface with the PLCs and the master show action PLCs to provide enable cues and triggers so the show knows the equipment is doing what it is supposed to do. We don't

Photos: Courtesy of Moustrappe

drive any of that directly. The motor controllers set the acceleration and deceleration rates and provide limited feedback, so we can know if something's faulted or failed."

To fabricate the racks and install the audio system, Electrosonic brought on SoundWorks System Integrators, with Rob Pourciau as project manager. There are a good two dozen loudspeakers in the theatre: 11 in front, four on each side wall and on the back wall, plus subwoofers and overhead speakers mounted on the catwalk above. The speaker array includes six Renkus-Heinz PNX151T two-way biamps, nine Renkus-Heinz PNX 82/9 dual 8"-wide dispersion speakers, eight QSC SR-110B cinema surround loudspeakers, 10" two-way 2 Tannoy Reveal 5A speakers and four Renkus-Heinz PNX 212 unpowered dual 12" subwoofers. The museum tech staff that maintains the theatre is headed by Paul Parrie, who was involved tangentially throughout installation.

Andy Batwinas did the audio design and theatre layout, and determined speaker placement. "Because the scrim couldn't have the typical LCR setup, we had to put speakers above and below the scrim to give the illusion that the sound is coming from the center of the scrim," says Calver. "That was the biggest audio hurdle, because we didn't have traditional locations: Speakers are well overhead and down at seat level. It was a challenge more from a mixing standpoint, but performs well with good coverage and plenty of volume—which is what you want in a WWII battle scene."

The main show audio is set up as a 24-channel discrete playback system from an Alesis HD24XR hard drive, one speaker per channel. A Peavey MediaMatrix NION-6 digital matrix mixer handles sound distribution and signal processing. Output from the mixer travels via CobraNet to a trio of QSC Basis amp controllers, then to 19 QSC amplifiers.

Lighting, effects, and additional control

This automated theatrical presentation, with its layers of projection, effects, and surround sound, also has layers upon layers of control to deliver the experience again and again with precise timing and sequencing. An ETC Ion control console and ETC Net3 data distribution system run a host of fixtures including some 400 ETC Source Fours, as well as other devices producing or contributing to effects such as the choreographed searchlight sequences (using fixtures with gobo rotators tied to custom profiles), the nuclear explosion (simulated with sound, wind, vibration and strobes), the snow effects, and more.

"The Medialon show control system drives the Ion console and fires the cues," explains Michael Mahlum, associate principal designer with Visual Terrain. "All the lighting data distribution is done via an ETC Net3 network that is then turned into DMX512 at key locations to control all of the different equipment. One of the most impressive elements of the Ion console is its ability to interconnect to all sorts of different devices. For the show, it uses serial RS232 for the different control interface signals. The beauty of the Ion is that it can handle the conventional fixture programming as well as more sophisticated equipment, such as automated lights. This is apparent in the fact that the snow effects are fired by the Ion, as well as the hazers and the wind effect, and other components that are DMX-controllable. You have to have the Ion, because it is the controller outputting the cues to the lighting fixtures themselves and combining the complicated timing of lighting effects with the rest of the show."

"Show lighting in a 4D cinema environment is always tricky; if done incorrectly, it can negatively impact the experience instead of immersing the viewer further into the story," says Lisa Passamonte Green, chief executive officer of Visual Terrain. "The lighting design had to enhance what was going on, not distract from the moment. That's where you want precise control and precise fixtures. For example, there is a custom automated searchlight on the guard tower, which, through a series of special sequences we wrote for it, looks like somebody is actually moving the fixture, searching the audience. It is meant to be uncomfortable and take the audience from passive observation to a more visceral place. One of the limitations of a themed environment, versus a traditional theatre, is you can't run an extension cable. You must follow the code requirements of permanent construction. This means you must be sure of your fixture choices, where they are mounted, and how they are controlled, maintained, and operated over the lifetime of the show. Primarily, our fixtures are ETC Source Fours with various beam spreads; we also have some Martin automated fixtures. We use lighting positions between the screens, in the pit, and over the audience to light the snow and smoke or replicate the sun beating down in the Pacific. Unlike a traditional cinematic experience, where there are only house lights that raise and lower to signal the beginning and the end of the movie, our

A show at the Stage Door Canteen.

Photos: Courtesy of the National World War II Museum

A wide view of the Stage Door Canteen.

lighting is another storytelling layer to extend the movie beyond the multiple screens."

The Stage Door Canteen

The ETC Ion console does double duty in the StageDoor Canteen, which tends to be a museum visitor's next stop after experiencing D-Day in the Victory Theatre. The 90-minute automated show takes visitors back to period wartime entertainment. It is synced to a multitrack Medialon system that triggers the Ion console. "We needed a system that could handle all the show control needs," says Ted Mather, project designer for Available Light, the lighting consultant. "When somebody rents the hall, they have a console that a local designer can easily work with, and the museum staff only need know the one console." The Stage Door system was commissioned by Bandit Lites; show installation was overseen by producer Jonathan Foucheaux, of the Solomon Group. There is also an ETC Paradigm architectural lighting controller, tied into the Ion.

The Stage Door is a "small theatre—not quite a black box—with a 10' x 25' apron-shaped stage, a U-shaped balcony, and USO theming," says Mather "It is a '40s-themed show, and the house has tables and chairs like a little dinner theatre. It's easily reconfigured. The show includes some 3D projections and fancy projection effects, so the backstage contains projection equipment. The lighting package is fairly simple: mostly ETC Source Fours, plus color changers, and some Martin moving lights. The house lighting is all LSI track lighting."

The theatre-lighting package uses numerous ETC Source Four fixtures, with Net3 control. An ETC Unison Paradigm architectural lighting system interfaces with all the control stations and house lighting in the Stage Door Canteen as well as the American Sector Restaurant in the same building.

"The National World War II Museum must collect, record and pass on their stories for the next generation," says Phil Satre, chairman of the Museum's national board of trustees. With experiential exhibits such as *Beyond All Boundaries* backed by collections, the museum is endeavoring to bridge the gap between the "Greatest Generation" that is now fast dying out and the younger generations of today and tomorrow whose connections to and understanding of World War II may be tenuous—in contrast to many of the creatives on these projects, whose parents or grandparents experienced the war. Phil Hettema's own personal tie was a powerful one—his father, David Hettema, was an Air Force pilot in the war, flew B-17s, and conducted 30 missions over Germany. But like many World War II vets, he rarely, if ever, spoke of his experiences with his family. The museum affords him,, and many others, the opportunity to share their stories.