



The Space Congress® Proceedings

2003 (40th) Linking the Past to the Future - A
Celebration of Space

May 1st, 1:30 PM - 4:30 PM

Paper Session II-A - Revisiting the Dawn of the US Space Program: Application of Virtual Technology to Space History

Lori C. Wolaters

University of Central Florida, Department of History

Follow this and additional works at: <https://commons.erau.edu/space-congress-proceedings>

Scholarly Commons Citation

Wolaters, Lori C., "Paper Session II-A - Revisiting the Dawn of the US Space Program: Application of Virtual Technology to Space History" (2003). *The Space Congress® Proceedings*. 6.

<https://commons.erau.edu/space-congress-proceedings/proceedings-2003-40th/may-1-2003/6>

This Event is brought to you for free and open access by the Conferences at Scholarly Commons. It has been accepted for inclusion in The Space Congress® Proceedings by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu.

EMBRY-RIDDLE
Aeronautical University™
SCHOLARLY COMMONS

Revisiting the Dawn of the US Space Program: Application of Virtual Technology to Space History

Dr. Lori C. Walters
University of Central Florida, Department of History

Abstract

The name “Cape Canaveral” evokes visions of bright orange gantries lining windswept shores, where the United States departed on its voyages to the heavens. Future generations of aerospace historians and engineers will look back to the Cape as hallowed ground. Undoubtedly, they will be cognizant of the names Mercury, Gemini and Apollo, but will they be aware of the thousands of contractor, civil service and military workers who supported these giant leaps for mankind and technology? And what of the aging launch structures?

The University of Central Florida and the US Space Walk of Fame Foundation have initiated oral history projects to capture the reflections of pioneer space workers. As we near our 200th oral history interview, we are only beginning to understand the social and technical dynamics surrounding their Herculean efforts during the infancy of this nation’s missile/space industry. These interviews are a touchstone to a bygone era and will permit future scholars and citizens the opportunity to learn from those who were there.

While priceless, these oral histories are only a two dimensional link to the past. The human brain processes and assimilates knowledge more effectively in a three dimensional fashion [Sheppard]. Advances in virtual technology offers more than a detailed recreation of significant events in space history, they act as a highly effective multi-sensory educational tool. The Institute of Simulation and Training and the History Department at the University of Central Florida have embarked on a joint venture to recreate historic events at Cape Canaveral through computer simulation. The first phase of the project is Launch Complex 14 as configured in February 1962 for the launch of the “Free World’s First Man in Orbit” – John Glenn. Users can witness all aspects of the launch procedure and interact with the computerized simulation, change views and move through the launch timeline. Our envisioned experience will incorporate portions of oral history interviews of those present at the launch, ensuring the element of humanity is not forgotten.

Introduction

When asked to comment about great events of the 20th Century, Walter Cronkite noted that in a century filled with scientific and technological advances, what would be seen as “a hallmark of the century 500 years from now will be the fact that man escaped his environment and went out into space” [Cronkite]. Project Mercury, together with the concurrent efforts of the Soviet Union, represent the earliest attempt by humanity to break the atmospheric bonds of earth and satiate a ceaseless desire to explore. It is not merely a defining moment of the 20th century; it is a defining moment in the history of humanity whose significance will increase with the passage of time.

On 20 February 1962 John H. Glenn sat atop an Atlas booster at Cape Canaveral’s Launch Complex 14 ready to become the first American to orbit the earth. Few present at that epic moment in 1962 could have envisioned the present decay to this temple of concrete, steel and technology. Its steel launch gantry succumbed to the sea-salt spray in 1976; today all that remains is a weed riddled concrete

superstructure. Figure 1 shows the entrance to LC 14 – the blockhouse is to the left and the remains of the concrete ramp and pad area are in the distance. The cost of restoring LC 14 to its former glory would be prohibitive and the audience limited due to its location on an active United States Air Force installation. Current computer simulation technology permits the resurrection and dissemination of LC 14’s heritage to those born after the events in a cost-effective manner.

Why we selected LC 14 and launch of John Glenn:

- ✍ The historical significance of Launch Complex 14 and the first US manned orbital flight.
- ✍ The 1998 shuttle flight of John Glenn confirms his lasting importance in American culture.
- ✍ Attention to the current state of this historically significant site.
- ✍ Manageable size of Mercury workforce and equipment details.



Figure 1 - Launch Complex 14, 2003

Brief History of Launch Complex 14

The detonation of the Soviet Union’s first hydrogen weapon and the successful testing of an American hydrogen bomb compact enough to be carried into enemy territory by a missile led to a decision by the Eisenhower Administration to increase funding for the development of ballistic missiles. This infusion of defense money sparked the rejuvenation of the Convair Corporation’s sputtering MX-1593 missile program. The MX-1593 would be known as the Atlas, destined to support the weight of the Free World on its shoulders. Atlas was earmarked to become the nation’s first operational intercontinental ballistic missile by 1960 [Chapman, 63]. Launch complexes 11,12,13, and 14 were constructed on the northern half of Cape Canaveral to aid in the testing and development of the Atlas. The number of anticipated massive explosions during development predicated the construction of four near identical complexes so that work could continue on alternate complexes should a pad experience significant damage. These complexes would form the heart of what became popularly known as ICBM Row.

Construction began on LC 14 in 1956 with the clearing of palmetto thickets – representative of the wild Cape terrain. The term complex refers to the actual launch pad, stand, service towers, blockhouse and the myriad of smaller support facilities. 11 June 1957 marked the first launch from LC 14 and the first launch attempt of the Atlas from the Cape. Designated as Atlas 4-A, the mighty missile confidently climbed into the sky then suddenly began to tumble, forcing the range safety officer to initiate

the destruct mode [Chapman, 127]. After being designated as the launch site for the planned orbital Mercury flights, the complex underwent reconfiguration due to additional requirements of the manned operations over ICBM testing. Modifications included the addition of the white room to protect the Mercury capsule from the elements, supplementary fire suppression equipment, and the emergency egress tower [Results, 47]. The Mercury-Redstone suborbital flights of Alan B. Shepard and Virgil “Gus” Grissom, 5 May 1961 and 21 July 1961, utilized LC 5/6. Friendship 7, Glenn’s Mercury capsule, arrived at LC 14 for mating with the Atlas booster on 3 January 1962 with an anticipated launch date of 27 January 1962. After a series of delays, John Glenn became the first American to orbit the Earth, leaving the concrete and steel confines of LC 14 at 9:47:39 am EST, 20 February 1962. Astronauts M. Scott Carpenter, Walter M. Schirra, and L. Gordon Cooper would follow Glenn into space from LC 14.

Following the conclusion of Project Mercury in May 1963 with the successful flight of Cooper, LC 14 continued as an active launch complex for the Project Gemini Atlas-Agena target vehicles. The final launch from LC 14 occurred on Armistice Day in 1966. In all, LC 14 sent aloft 32 Atlas vehicles, including the four manned Mercury orbital flights. The development of reliable silo based solid fuel missiles, such as the Minuteman, led to a decreased necessity for massive new ICBM programs – a mere ten years after its construction, the complex was now a relic of the past. Abandoned, the facility succumbed to the harsh Florida climate and sea-salt spray. Considered unsafe, the gantry and service towers were demolished 1 December 1976. The twisted rusting remnants of the Free World’s First Man in Orbit were auctioned for scrap to C.H. Zipperer of Savannah, Georgia. Recognizing the historical significance of the site, the United States Air Force completed a renovation of the aging blockhouse in 1998. Long since stripped of its Atlas era consoles, the blockhouse has a new role; the former beehive of activity is now a conference center where visiting dignities and others find themselves in the same surroundings as Convair test conductors Calvin Fowler and TJ O’Malley – the men who launched America’s first four orbital astronauts.



Figure 2 - John Glenn at LC 14, 1962

Figure 3 - Service Tower Demolition, 1976



Applications of Virtual Technology to History

The entertainment industry and military have been the primary patrons of virtual reality. The prohibitive cost of early virtual equipment significantly limited use in the educational arena. However, recent and forthcoming virtual technology breakthroughs continue to reduce the cost and increase the user friendliness of equipment and will lead to one of the most promising educational tools since Richard Hoe's perfection of the steam cylinder rotary press made books affordable for the masses. The educational potential of virtual technology to history and archeology is immeasurable. Imagine the prospect of experiencing the splendor of Ancient Roman architecture, the harsh working environment of a Victorian steel mill or the horror of trench warfare during World War I. Three-dimensional computer visualization --combined with sound, temperature variations and even simulated odors can provide an individual with an unparalleled understanding of a historic event. The paramount educational benefit of historical simulation is user interaction with the past. The virtual environment permits an immersion lesson rather than the traditional who, what, where, when and why facts presented in texts and documentaries.

There are notable projects utilizing three-dimensional technology in the areas of history and archeology. The Urban Simulation Team at the University of California, Los Angeles and the Getty Education Institute in Los Angeles have undertaken a joint effort to simulate the Roman Forum of Trajan. Constructed between 106 and 112 the massive size of this public structure, roughly nine football fields in area, symbolized the power of the great ancient empire centered in Rome [ArtsEdNet]. Today the forum lies under the roads and buildings of the modern Italian capital, only a small portion exposed for archeological examination. The available archeological evidence and historical accounts provided the necessary data to recreate the structure to a reasonable degree of accuracy. Figure 4 is an example of their effort, an interior of the West Library, note the textural detail. In addition to 'visiting' a historic site, such efforts afford the opportunity augment traditional museum exhibits by placing a static museum artifact in its historic setting, greatly enhancing the educational experience.



Figure 4 - Forum of Trajan 3-D Virtual Simulation - J. Paul Getty Trust Image

The application of virtual technology is not limited to the recreation of inaccessible archeological sites. A project underway in Egypt is applying three dimensional computer simulation to the tombs of Nefertari and Setti I – not to recreate what no longer exists but to preserve what remains. The project

hopes to reduce physical damage to the fragile site from visitors and open the cultural treasure to a world audience through the Internet. The Virtual Reality Centre at the University of Teesside in Great Britain has developed a number of historical virtual simulations including the opening of the world's first railway line. Although the Stockton-Darlington Railway project provides limited real-time interaction, it does provide the user with the "passenger" perspective.

Launch Complex 14 Project Steps

The Launch Complex 14 simulation project shares an obstacle similar with virtual three-dimensional GIS (Geographical Information Systems) efforts undertaken by Istanbul Technological and Koc Universities in Turkey. The region along the Dardanelles is one rich in ancient historic and culturally significant sites. Unfortunately, this abundance of ancient archeology contributes to a cavalier attitude regarding historical value of more recent sites – in this case fortresses constructed during the final centuries of the Ottoman Empire. While Launch Complex 14 is certainly far more contemporary than a 19th century Ottoman fort, our endeavor faces a prevalent belief amongst humans that events occurring within one's own lifetime might be "the good old days" but it simply is not "history". No one would consider the disposal of a family letter dating from the Revolutionary War period, no matter how trivial the content. How many today possess the same reverence for a box of memos, letters or reports dating from 1963? However, future historians will rejoice in this example of "late 20th century" documents. Why must history be fit for preservation only after the trail consists of pottery fragments and yellowed documents? We have before us the opportunity to recreate one of the key events of the last century – the very moment in which humanity took its first infant steps toward the stars. While some will scoff that insufficient time has transpired for the 1960s to be history, this is in actuality a notable advantage. Many missilemen who participated in the launch of Glenn are still alive. Their comments will augment traditional research and guide our project to ensure an accurate representation that subsequent generations can learn from unfettered from the concern, "was it really like this?"

The Launch Complex 14 simulation is the first phase in a larger effort to recreate the whole of historic Cape Canaveral Air Force Station. As envisioned, the simulation will be a total immersion experience. Preliminary designs call for a museum exhibit where users can "walk" around the complex via a 360° screen. Small groups, no greater than twelve, enter into the exhibit and are greeted by the visual vista, sounds and smells associated with the complex. They can choose a direction to explore by voting through hand held keypads. Our time travelers can walk around the complex, ride the elevator to the top of the service gantry to witness the capsule insertion of Glenn. After a brief "talk" with Glenn, the visitors are escorted to the detailed simulated blockhouse where they can interact with workers and then watch the launch via actual film footage on television monitors or periscopes. A secondary component of the exhibit enables visitors to sit in Friendship 7 and experience the launch from the astronaut perspective. This includes pre-launch communications and the feel of an actual launch. A simplified version of pilot training simulators will be utilized.

A more immediate product involves an in-home use CD/DVD package. While three-dimensional home computer capabilities do not permit the immersion experience of the museum exhibit, it does offer an opportunity to personalize and increase the interactive aspects. The experience is non-linear, users are free to wander, accompanying historical data screens can be used to enter a specific operation associated with the launch and witness the task from any complex vantage point. This includes, but is not limited to, missile erection, capsule mating, fueling, astronaut insertion and of course lift-off. Users can interact with computer generated images of workers. Clips of interviews with actual participants will be interwoven with their computer generated counterparts. Information about equipment function and operation can be obtained when the user clicks their mouse on the computerized image and reveals imbedded data screens. It should be noted in addition to Glenn's launch, the CD/DVD package will offer scaled down simulation experiences of other Atlas launches from LC 14 – both manned and unmanned.

We intend to layer the CD/DVD version to accommodate all educational levels so that a five-year-old can experience and learn basic elements, while a historian or engineer can garner a tremendous breath of knowledge. Figure 5 provides an outstanding view of LC 14 in preparation for Gordon Cooper's flight and it is a representation to the degree we wish to achieve.



Figure 5 - Launch Complex 14, 1963 - NASA Photo

Currently, emphasis is being placed on the collection of data required to achieve the level of accuracy desired for the physical layout of the simulation. The archival holdings of the Florida Space Coast Project at the University of Central Florida, 45th Space Wing History Office at Patrick Air Force Base, Air Force Space and Missile Museum at Cape Canaveral Air Force Station and Kennedy Space Center have yielded blueprints, photographs, and motion picture footage. We have compiled an extensive photographic record of the complex ranging from construction, unmanned and manned missions through to its demolition. Blueprints provide a basic framework and ensure an accurate representation in relation to scale. Photographs, artist renditions and films are then examined to add depth and texture to surfaces and provide placement of equipment. Construction photos will permit users to peel back the skin of large complex components to reveal the skeletal workings.

Existing logs, official communiqués, and reports provide the timeline and assist in unfolding the historical experience. Oral history interviews with participants are both a research tool and component of the experience. An immeasurable asset, the missilemen can confirm the physical accuracy of the simulation and of even greater importance provide the frail link of humanity to the past. This is an attempt to not only to recreate the physical landscape of LC 14, but to provide a glimpse into the human interaction within that environment.

Conclusion

The virtual restoration of Launch Complex 14 will provide an unparalleled look at a seminal moment in the technological advance of humanity. Traditional methods of recording history such as the written document, photograph or even film are two-dimensional. While capable recording instruments, such mediums are closed glass windows to the past. The application of the third-dimension through virtual technology, opens a door to observing the past's physical framework. The addition of the actual human experience through the memories of those who were there assists not only in an accurate capture of an historical event, it permits individuals to walk through the door and interact with the past.

References

- ArtsEdNet. The Forum of Trajan in Rome.
<http://www.getty.edu/artsednet/Exhibitions/Trajan/commence.html>
- Chapman, John L. *Atlas: Story of a Missile*. New York: Harper and Brothers, 1960.
- Cronkite, Walter. *National Geographic Famous Faces Interviews*. Interview by Bella Desai. February 1998. <http://www.nationalgeographic.com/faces/cronkite/interview.html>
- Guney, Caner, Ozsavasci, Arzu , Ozoner, Bihter, Thys-Senocak, Lucienne, and Celik, Rahmi. *Virtual 3D GIS Application at the Ottoman Fortresses on the Dardanelles*.
http://169.229.138.138/unesco/papers/3232_1000-AlexandriaPaperManuscript.doc
- National Aeronautics and Space Administration, Manned Spacecraft Center, *Results of the First U.S. Manned Orbital Space Flight, February 20, 1962* (Washington, 1962).
- Rashed, Sherin, Mistri, Afshad. *World Heritage in the Digital Age*.
http://169.229.138.138/unesco/papers/3277_1032-VirtualWHCongressPaper3_low_res.doc
- Sheppard, Stephen. *Visualization Software Bring GIS Applications to Life*. GeoWorld March 1999.
<http://www.geoplance.com/gw/1999/0399/399life.asp>
- Swanson, James. *The Three Dimensional Visualization & Analysis of Geographic Data*.
http://maps.unomaha.edu/Peterson/gis/Final_Projects/1996/Swanson/GIS_Paper.html