Introduced in September of 1962[1] and lasting in the market until 1975[2], the Sony 2" Helical video system was the smallest video tape recorder then being barely 1/50 of the size of its broadcast VTR predecessors [3]. Utilizing the "1.5-head" design with one head recording only vertical synchronization signals, it was considered to be portable bringing a revolutionary breakthrough in miniaturization.[4] The initial model introduced to the market was the Sony PV-100 followed by the PV-120 and PV-120U just a few years after. Given its technical features it was easily adopted by different industries that seek portability and convenience. In particular it was widely used in in-flight video systems of airlines and as educational tools of companies and schools. In addition, given its instant replay and slow motion functions, it greatly had an impact in sports, both in coverage and spectatorship.[5]

Audiovisual formats come and go and most end up as mere footnotes in the history of moving image technology. Regardless, each format that developed from technological progress, introduced to the market and engaged by the public has one way or another shaped the moving image technology of today. One such format is this short lived Sony 2" Helical Video that technologically pushed the miniaturization of broadcast VTRs, economically changed in-flight movie systems and socially influenced sports culture. Despite all these, the format is barely discussed in moving image history as evident in the dearth of literature available regarding it. Given the underrated appreciation of the Sony 2" Helical video system, this paper aims to trace and analyze the historical emergence, existence and obsolescence of this format within these technological, economical and social contexts.

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[1] The Sony Discover Blog. *Flashback Friday: VTR PV-100.* Accessed on 18 October 2010 at <http://blog.discover.sonystyle.com/flashback-friday-vtr-pv-100>

[2]DC Video. *Sony 2" Video*. Accessed on 13 October 2010 at <http://www.dcvideo.com/obsolete-video-formats/2-inch-sony-helical.html>

[3]Sony Design. *PV-100*. Accessed on 13 October 2010 at <http://www.sony.net/Fun/design/history/product/1960/pv-100.html>

[4]Vidipax. *Sony PV-100*. Accessed on 18 October 2010 at <http://www.vidipax.com/museum/msm31.html>

[5] The Sony Discover Blog. *Flashback Friday: VTR PV-100.* Accessed on 18 October 2010 at <http://blog.discover.sonystyle.com/flashback-

Expanding by Thinking Smaller: *A Technological Context*

The Predecessor: The Quad

The Sony 2" helical video system is one of the key milestones in video tape recorder (VTR) development by introducing the helical system to the market and doing so in a portable package. These two key technological breakthroughs were what separated the format from its bulky quadruplex predecessor.

Developed by the American Ampex corporation, Quadruplex VTRs or Quads, enabled videotape to become a standard production technology in television studios worldwide. In March 1956 Ampex introduced the VRX-1000, which utilized four rotating heads mounted in a cylindrical assembly, across which 2-inch tape passed at a speed of 30 inches per second. The rotating heads recorded a number of parallel diagonally positioned modulated records.[6] This type of system and machine was the first to be able to reproduce video signals that enabled stable pictures of good quality. [7]

This served as the foundation for later developments of the quadruplex system which was improved to scan the videotape at a 90 degrees angle as it travels by at a higher speed of 15 inches per second with the heads rotating at 14,400 revolutions per minute.The focus was to improve the writing speed, meaning increasing the speed at which the head rotates, the speed at which the tape is pulled through the system, and the size of the head drum.[8] This enabled more signals to be recorded on less tape while still producing extremely high-quality images containing about 400 horizontal lines of video resolution.[9] With such improvements, the quad was extensively used and was considered as the standard then in broadcast studios.

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[6] Enticknap, L. D. G. (2005). *Moving image technology : From zoetrope to digital*. London ; New York: Wallflower Press. p. 177

[7] Robinson, J. F. (1976). *Using videotape.* New York: NY: Hasting House Publishers. p.32

[8] Compesi, R. (1990). *Small format television production.* Boston, MA: Allyn and Bacon. p.111

[9] The History of Recording Technlogy. *Tape Recording Technology.* Accessed on 18 October 2010 at

<http://web.archive.org/web/20040603152849/http://www.tvhandbook.com/History/History_recording.htm>

The quad system continued to develop and remained a standard until the late 1970s. Though the 2" quad machines worked well in broadcasting, other potential video users found them impractical because of their size and technical complexities. Quad VTRs then were as big as two refrigerators and required professional human and technical support.[10] This made the quad VTRs stationary immovable machines in studios. There are a few electronic circuits and complicated maintenance that required the staff who maintain such equipment to have high technical knowhow. These features make such equipment unrealistic for many potential users to whom the ability to record and playback either a television program or some other wideband analogue signal could revolutionize their method of working as much as it did the broadcast industry. [11]

There was also a problem with regards to the colors and boundaries of the image being produced. Given that an image is comprised of 16 signals from four different heads with varying properties, image color were at times uneven and the boundaries noticeable. [12] Given these realities, companies began developing technologies to improve and simplify portable video recording.

The Predecessors: The Race to Helical Scan

The helical scan was seemingly a natural technological progression from the quad system. The research on the technology started in 1954 in Japan lead by the company Toshiba. In response to the aforementioned issues on the quad Dr. Kenichi Sawazaki initiated a research on rotary heads by testing various recording methods. His goal was to lessen the needed heads while still increasing the amount of material that can be recorded on a tape. [13]

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[10]Bensinger, C (1981). *The video guide 2nd ed*, Santa Barbara, CA: Video-Info Publications. p.60

[11]White, G. (1972). *Video recording: record and replay systems.* London, England: Butterworth & Co. p.3

[12] Toshiba: Project Technology History. *Helical Scan VTR.* Accessed on 18 October 2010 at <http://museum.toshiba.co.jp/history/1goki/1959vtr.html>

[13] *Ibid.*

In 1955 Dr. Sawazaki applied for a patent for a helical scan videotape recorder featuring one head with a 360 wrap. This was later developed and in 1959 Toshiba demonstrated to the public their helical scan videotape machine prototype. It had the tape running in a helical loop around a cylinder containing one video head. It used two-inch tape running at 15-inches. It was claimed that this new system could reproduce pictures at any speed, whether fast forward, slow forward, rewinding or even stopped. This was because each television field was recorded on one long track, so that as the head rotated it would repeat one field even when stopped. [14]

Unknown to many, Ampex in 1956 was also working on a helical scan system and was able to produce a prototype that same year. This makes Ampex the first maker of a helical recorder. Ampex did not however release the machine to the public as they had only recently then launched their Quad machine. But after Toshiba presented a paper on the helical system during the SMPTE conference in 1960, Ampex geared up for the next convention in Chicago fearing that Toshiba might introduce their helical machine. At the convention, Ampex ended up not introducing their VR-8000 helical recorder as Toshiba did not demonstrate any helical machines. Given that their quad machines were enjoying a big share of the market, Ampex thought it best not to introduce a new technology unless a competitor plans to release one. [15]

In March 1961, Ampex did release the VR-8000 in response to JVC's two-head helical scan videotape recorder and Toshiba's single-head slant track monochrome unit that were released January and February respectively of the same year. All three machines made use of the helical system and were targeted for closed-circuit non broadcast use. [16]

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[14] Abramson, A and Sterling, C. (2007) *The History of Television, 1942 to 2000.* McFarland Publications. pp. 86-87

[15] The History of Recording Technlogy. *Tape Recording Technology.* Accessed on 18 October 2010 at

<http://web.archive.org/web/20040603152849/http://www.tvhandbook.com/History/History_recording.htm>

[16]Abramson, A and Sterling, C. (2007) *The History of Television, 1942 to 2000.* McFarland Publications. p. 92

The Helical Scan

It was Ampex and Toshiba who developed the helical scan recording system but despite their initial market attempts together with JVC, it was Sony that was able to first utilize the technology and adapt it for commercial use. Regardless, these companies built together the foundation of the helical scan technology widely developed and used until today.

Helical scan recording is the process of recording video signals at an angle. It is called helical because the tape is wrapped around the head drum inside the machine in the form of a helix. The drum remains stationary while the tape is in continuous motion as the head/s rotate on a wheel inside the drum recording diagonal tracks on the tape at an acute angle normally between 3 to 20 degrees. As such each slanted track on the tape contains one field of video information.[17] In this recording system the head is made to rotate against the tape at a high speed while the tape itself moves at a relatively slow speed. To be able to do this, the head is tilted so that at each rotation of the head, a new area of tape is brought into play. [18]

The head scans the tape diagonally and with the proper slant track angle, one field of composite video is recorded on one track. This is a method of scanning that results in tape efficiency better than that of the quad system. Furthermore, the slant track scan system results in a distortion-free picture particularly from scalloping and venetian blind effects that are usually seen coming from quad scan systems. Also, mechanical positioning of the video head is less critical and a complicated head-motor servo system is not required. The helical system also enables still framing, a feature not available via quad. This is made possible given that the head lays down one complete frame on each track. [19]

[17] Robinson, J. F. (1976). Using videotape. New York: NY: Hasting House Publishers. p.32

[18] White, G. (1972). *Video recording: record and replay systems.* London, England: Butterworth & Co. p.88

[19] SONY. (1964). *Technical Manual, Service Instructions: Videorecorder Model PV-120.* p. 3.3

Sony's Take on the Helical Scan

Sony took these fundamental characteristics of the helical scan system and developed the technology further to create VTRs that would be profitable in the market. On March 20, 1961 Sony introduced the Sony Model SV-201, a 65-pound transistorized two-head open reel helical scan recorder using two-inch tape. Sony's first videorecorder was made possible through an earlier deal with Ampex, wherein the latter provided their patent to the former provided that Sony focuses on non-broadcast machines. But with the transistorized SV-201, Sony broke ties with Ampex and began a helical revolution. [20]

In September 1962, Sony broke grounds with the Sony PV-100. Invented by Nobutushi Kihara in Japan, it was then the world's smallest transistor VTR at approximately 145 pounds and the size of one-fiftieth of broadcast VTRs. It was a two-head, helical scan machine that had a tape speed of 7 ½ inches per second. It was considered "portable" and represented a revolutionary breakthrough in miniaturization, being the first to utilize the "1.5-head" design wherein one head recorded only vertical synchronization signals. It captures and reads black and white images and mono sound. [21] The PV-100 featured a simple and convenient design covered in a neat gray and silver casing. With the built-in handles, two people can hold and move it accordingly, and the panels are removable for maintenance. [22] The V-21L 2" open reel self-lubricating video tape that goes with the PV-100 entered the market too. [23] The PV 100 21L were intended for business and industrial use specifically in the field of education and medicine. [24]

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[20] Abramson, A and Sterling, C. (2007) *The History of Television, 1942 to 2000.* McFarland Publications. pp. 92-93

[21] Vidipax. *Sony PV-100*. Accessed on 18 October 2010 at <http://www.vidipax.com/museum/msm31.html>

[22] Sony Design. *PV-100*. Accessed on 13 October 2010 at <http://www.sony.net/Fun/design/history/product/1960/pv-100.html>

[23]Sony Asia. *About Sony Media: 1950-1972.* Accessed on 18 October 2010 at <http://www.sony-asia.com/microsite/b2b/about/sonymedia/index.html>

[24]Southwest Museum of Engineering, Communications and Computation. *SonyVideoflight Facilities, History and Equipment . Accessed on 13 October 2010 at* <http://www.smecc.org/sony_videoflight.htm>

A few year afters, Sony introduced the PV-120 and PV-120U. Improving on the features of the PV-100, both models entered the market and was relatively successful. The PV-120 compared to PV-100 was color capable by using an external color adapter pack. The PV-120U on the other hand already integrated the color circuits and as such did not need an external adapter.

Packaged in a compact and rugged configuration, the PV-120 was considered extremely versatile then weighing only 148 pounds. Like its predecessor, it focused on operating convenience with the control buttons simplified. It comes with a remote control that duplicates all the functions on the control panel. The PV-120 was also the first videorecorder to have the stop-look and variable speed features. Picture speed is continuously variable from one-fifth normal to zero in both the forward and reverse directions of tape travel. Slow motion analysis can be made, or the picture can be stopped completely for close inspection. These are indispensable features that PV-120 introduced to sports and industrial applications. [25]

Using only two heads, one recording composite video and the other the vertical sync signal, it produces a sharp and stable image. Two audio channels are available and simultaneously records the video and audio channels with original live fidelity. On a 7-inch reel of a 2-inch wide tape, the PV-120 can store around 80 minutes of recording at 4-1/4 inches per second, while the PV-120U operates at 5-3/4 inches per second storing signals for roughly 63 minutes. Signal-to-noise ratio is better than 42db for video and better than 40db for audio in both channels. It has an average tape life of 1000 tape passes and a video head life of 1000 hours. Recordings from these three different models are not interchangeable, with a machine being able to play only the tapes recorded on it. [26]

[25] SONY. (1964). *Technical Manual, Operating Instructions: Videorecorder Model PV-120.* p. 1.1-1.3

[26] SONY. (1964). *Technical Manual, Service Instructions: Videorecorder Model PV-120.* p. 3.3

Technological Obsolescence: The Pros and Cons of the Format

Sony's 2" helical machines did not last long, partly due to short-lived commercial success but mostly due to technological development. The standardization of the recording format was made in the early days of the broadcast quad machines. This standardization enabled quad to remain in use by the industry for a long time. Unfortunately, no such progress was achieved early on with the helical scans. Primarily caused by the large number of manufacturers that competed who presented varying iterations of the system, none of which really caught on. At that time equipment used one or two recording heads, four different tape widths, fifteen different tape speeds and three methods of wrapping the tape around the drum. These inconsistencies drove the adoption of the technology to a halt.[27] By 1972 alone, BBC had 42 machines most of which were varying helical scan videorecorders.[28]

To add to this, though color recording of the Sony PV-120 and PV-120U were not capable of producing a picture that matched the broadcast quality that of their contemporary quad machines.[29] Also, the wow and flutter rate of of PV-120 at .25% rms, was unacceptable for broadcast. Editing features were very limited as well, specially compared to the ones being provided by Ampex technology then.[30]

As early as 1965, Sony left the development of the 2" format and focused on developing the helical system using the different variations that were all over the market. September of that year, Sony released the TVC-2010, a home videorecorder that used ½ inch tape running at 7- 1/2 inches per second. The company then continued to find markets outside the broadcast companies while also investing in the development of higher quality and more efficient helical machines. [31]

[27] White, G. (1972). *Video recording: record and replay systems.* London, England: Butterworth & Co. p.88

[28] Pawley, E. (1972). *BBC Engineering, 1922-1972.* London: BBC Publications. p. 494

[29] SONY. (1964). *Technical Manual, Operating Instructions: Videorecorder Model PV-120.* p. 1.3

[30]Abramson, A and Sterling, C. (2007) *The History of Television, 1942 to 2000.* McFarland Publications. pp. 110

[31]*Ibid*.

Technology eventually moved away from the 2-inch format in search of this higher quality and efficiency. Sony, after its technological breakthrough with the 2-inch helical system eventually found success again with the 3/4" U-Matic. The U-matic improved on the features of its predecessor taking into consideration how the previous format was used by its target market. It was the first large-scale format to use cassettes as distinct from separate spools in the tape transport mechanism. With this format, Sony was able to be progressively more user-friendly as they initially intended with the 2-inch format. [32] The machine was portable, editing via the electronic control system was convenient and cost savings were estimated at that time to be around 70 to 80 percent for the news agencies who utilized this format. [33] Given the adoption of the format by the news industry, the U-matic successfully superseded the 2-inch format.

From a technological point of view, the Sony 2" helical video system was indeed a milestone in video recording as it successfully introduced the helical system to the market. Taking the technology of the quad system and improving it primarily for the non-broadcast market by making a system that is portable and convenient, the Sony 2" helical video system is a great achievement. However, as most initial technological successes, it was subjected to the fast developments that it came after it. The format became obsolete in the face of competing variations and inherent flaws that were rapidly improved on in succeeding formats. Nonetheless, the Sony 2" helical video system set a precedent for the direction of videorecording systems. That is, developing the helical scan system towards higher quality and efficiency, while providing greater convenience and portability amidst set standards. Sony, looking at its history, has clearly taken this direction.

[32]Enticknap, L. D. G. (2005). *Moving image technology : From zoetrope to digital*. London ; New York: Wallflower Press. p. 178

[33]Pawley, E. (1972). *BBC Engineering, 1922-1972.* London: BBC Publications. p. 494

Up in the Air: *An Economical Context*

A quad machine during the inception of the helical scan cost around $200,000 and a roll of 1-hour 2" quad tape was at $250. Broadcasting companies were able to handle such costs, but there were other users and markets who wanted their hands on video recording devices but could not afford the costs. [34]

Being the standard for broadcast, the quad enjoyed a seeming monopoly of the studio market. From an economic perspective then, it was strategic for helical scan system machines to target markets outside of the broadcasting industry. This foreseen commercial value impinged on the technological developments of the format as it focused on portability and convenience. To add to this was the technological feature of being able to play in rewind and forward in both slow and fast motions. These were features that were new in the market that the quad did not provide.

The Sony 2" helical scan machines leveraged these features as they were marketed mainly for industrial use. It was targeted for businesses to use in product demonstrations, product control and sales. Also for hospitals to record delicate operations and complicated treatments for immediate or later study and analysis. While for the entertainment industry, it was to enable recording and immediate review of rehearsals and productions.[35]

Given the portability, functionality and low cost of the Sony 2" helical scan machines, they were seen to have high market value usable in various industries and fields. Priced at 2.48 million yen in its initial release in Japan in 1962, the Sony PV-100 was exported to the USA by 1963 with Sony salespeople going from one business to another and venturing to secure partnerships with schools, hospitals and companies. [36]

[34] Bensinger, C (1981). *The video guide 2nd ed*, Santa Barbara, CA: Video-Info Publications. p.60

[35] SONY. (1964). *Technical Manual, Operating Instructions: Videorecorder Model PV-120.* p. 1.3

[36] Southwest Museum of Engineering, Communications and Computation. *SonyVideoflight Facilities, History and Equipment . Accessed on 13 October 2010 at* <http://www.smecc.org/sony_videoflight.htm>

The Sony Videoflight

The Sony 2" format secured its place in the market for a while when Sony was able to strike a partnership with American Airlines and Pan American for in-flight video servies. During that time airlines used 8mm and 16mm films for their in-flight movies. Film though was found to be difficult to handle by the flight attendants often resulting to damages. It was found to be inconvenient as well and the short amount of available recorded time in a reel was limiting. Because of this, the airline companies were very interested with Sony's proposal of using VTRs in airplanes instead of film. [37]

In 1964, both American Airlines and Pan American adopted Sony's proposal and began using PV-100 VTRs in their planes. The in-flight models of the PV-100 were adjusted to specifically fit the needs of the airline. Given that the recording function was not needed, the record electronics were removed to save weight and power consumption.The equipment was connected to 26 video monitors spread throughout the plane to provide simultaneous screenings from one playback machine. In addition, though the recording function was not available, passengers could see outside of the plane using the equipment's video camera located in the nose of the plane. [38]

Because of the success of this venture, Sony wanted to further its hold on in-flight entertainment by etablishing Videoflight, Inc in 1964. It was created to augment the sale of VTRs by providing content and not just the hardware. Videoflight was a film-to-tape transfer center transferring first run films to Sony video tape for use by the airlines in their airborne entertainment systems. It was then considered the biggest multiple video tape production facility in the world.

[37] Southwest Museum of Engineering, Communications and Computation. *SonyVideoflight Facilities, History and Equipment.* Accessed on 13

October 2010 at <http://www.smecc.org/sony_videoflight.htm>

[38] LabGuy's World. *Exinct Sony PV series 2" Helical VTR's (1962-63).* Accessed on 18 October 2010 at <http://www.labguysworld.com/Cat_Sony002.htm>

Sony was successful in this venture and through Videoflight brought two revolutionary market changes: (1) shifting the whole inflight entertainment industry from film to VTR and (2) creating a model for wide multiple video tape reproduction of content. The first impact assured Sony of a hold on the inflight market while the second one provided Sony a business model and a technical structure to venture in the entertainment industry.

Though the 2" format was the pioneer format to be used by Videoflight, it eventually became unsuitable to the growth of the production and the development of the technology. Flight attendants in particular were not able to treat the tapes with much care. They would jam the open-reel tapes while threading them or leave them near the beverage trays, where inevitably drinks would spill over. The original estimate that the tapes could be used at least forty times was completely off target, with tapes returning to Videoflight in pitiful condition even after just one use. [39]

The development of different formats utilizing the helical system and making the machine even more portable and efficient was rapidly progressing. To assure the sustainability in the market of Videoflight, it had to continuously adapt formats as they came. Two years after utilizing the 2-inch tape, the whole production began moving to 1-inch tape and eventually settled down for a considerable length of time with the 3/4" inch U-matic format.

It was the same story in the other markets and industries that the 2-inch tape format was initially able to enter. The format introduced the VTR to non-broadcast consumers but it was unable to keep itself relevant in the new market that it created. VTRs began then to be widely used and by early 1970 when the U-matic format was introduced, it became a norm in several industries while the two-inch tape was then nothing more than a mere welcome mat.

[39] Southwest Museum of Engineering, Communications and Computation. *SonyVideoflight Facilities, History and Equipment.* Accessed on 13 October 2010 at <http://www.smecc.org/sony_videoflight.htm>

A Second Look: *A Social Context*

The cultural impact of the Sony helical 2-inch format was as influential as its impact on technological innovation and market economics. By bringing the VTR to industries, communities and to a certain extent direct consumers, the Sony helical 2-inch format revolutionized the processes and cultures of different fields. The technological ability of recording and replaying instantly in variable-speeds together with the portability and cost-efficiency of the system, enabled the format to be used in groundbreaking ways.

Changing the classroom

One of the initial targets of the medium was the educational sector. The technology was primarily used to record broadcast programs, events and lectures to serve as educational tools. As a mass audiovisual tool it was able to permit a larger audience to receive information about subjects and from specialists that were not available in the premises.[40]

To some teachers this became a threat, as with its growth more and more factual knowledge would be gained by the students from a few producers of programs, rather than from the teacher in a classroom. However, like all new inventions which radically change tradition, initial alarm or too great enthusiasm gave way to gradual acceptance and greater understanding of its true place in the field. Many prejudices or too ambitious schemes were resolved overtime as the users and audience became familiar with such visual and aural material.[41]

Though moving images through film were already used as a tool in the classroom, the onset of VTRs through the Sony 2" helical format enabled greater production, reproduction and networking of educational materials. In addition, the features such as still framing and variable speed presented new ways of instruction specifically in the field of medicine and performance. [42]

[40] Robinson, J. F. (1976). *Using videotape.* New York: NY: Hasting House Publishers. p.10

[41] White, G. (1972). *Video recording: record and replay systems.* London, England: Butterworth & Co. p.4

[42] Robinson, J. F. (1976). *Using videotape.* New York: NY: Hasting House Publishers. p.10

Changing Sports

Being able to record and instantly replay in variable speed what has just been recorded, and having the ability to see stills clearly, were groundbreaking features for the world of sports. The PV-100 actually marked the beginning of instant replays. It also had a slow motion function which was greatly useful for referees.

Pre and post games, coaches and players were enabled to review and learn their play as well as check up on other teams. During the game, disputed fouls and calls can be reviewed for better judgement. The introduction of this technology has directly and indirectly improved sports in terms of equipping athletes and coaches with a tool to enhance their games both through evaluation and training. It was used in team sports such as football and hockey where team maneuvers can be rehearsed and analyzed collectively during training and post mortems made after matches. Self analysis in individual events such as golf, tennis and boxing is simplified through slow motion and still frame review. In addition, it help upheld the virtue of sportsmanship with a truly objective eye looking and recording proceedings. [43]

PV-100 made its sporting debut in 1963 at a Japan-USA swimming meet held in Tokyo. It was said that it enhanced the coaching techniques for the Japan Swimming Federation offering feedback on swimmer starts, turns and relay touches. [44]

It changed not only how the game was played but also how it was viewed by its spectators. The portability and efficiency of the machine enabled it to be brought to various sporting events making coverage possible. The variable-speed playing capabilities together with the editing options greatly improved the presentation of sport shows and coverage.

[43] Robinson, J. F. (1976). *Using videotape.* New York: NY: Hasting House Publishers. p.12

[44] The Sony Discover Blog. *Flashback Friday: VTR PV-100.* Accessed on 18 October 2010 at <http://blog.discover.sonystyle.com/flashback-

Upon the introduction of videotape for some specific purpose at a school, a hospital, a corporation, or a community center, imaginative people are often stimulated to start exploring the medium's potential. In a high school, what was originally and exclusively a tool for lectures becomes also strategic equipment for training football players and recording student plays. In business, video may seem immediately useful in training and public relations, but in many cases it moves to different departments and often its use increases in importance as its value appreciated more. [45]

Here lies the cultural impact of the Sony 2" helical format. By effectively introducing the VTR to these industries, these industries have one way or another reassessed how they do things and improved them by adapting the technology. Though Sony had ideas on how to utilize the machine, the industries were the ones who maximized and ultimately shaped how the technology was used.

But as the industries utilized the technology further and saw its potential, it began looking for further improvements and demanded higher quality and efficiency. This led to the rapid obsolescence of the Sony 2-inch helical format after it was done doing its job as an introductory piece to video technology.

Sony 2" Helical Video: The Welcome Mat

The impact of the format is indeed undeniable. Technologically, it pushed the boundaries of miniaturization and introduced the helical scan system and its groundbreaking features. Economically, it tested and confirmed the market for VTRs outside the broadcast industries and paved the way for mass production of content in videotape. Socially, it dramatically changed the culture of education and sports providing new means for instruction and spectatorship.

[45] Murray, M. (1974) *The Videotape Book: A Basic Guide to Portable TV Production*. New York: Taplinger Publishing Company. p183

But as groundbreaking as it was, the Sony 2" Helical Video was from the very beginning a test format – technologically, economically and socially speaking. And at that, it had a very successful run. Upon confirming the viability of the VTR to these industries within these contexts, developments had to rapidly occur inevitably leaving the pioneer test format dated.

Given that it was the first commercially successful helical video system and that it ran for a very short time within a limited scope, the format is considered obsolete today and existing machines are extremely rare. As equally rare are tapes with content during that time. The exclusive compatibility issues of the machine and the tape limits possible preservation activities for this format. [46]

Barely perfecting VTR technology as it is the pioneer market format, it is highly susceptible to wear and tear common to the VTR / VCR today. The video head life is limited as well and production of new heads has long ceased. Videotape longevity is very short as well. Transfer and preservation inquiries for this format have been extremely sparse, leading the already few vendors who have it to put this format way below in their list of maintenance priorities. [47]

And such is the case for the Sony 2" Helical Video – a welcome mat. Despite its groundbreaking impact to moving image technology, it will remain a mere footnote with an obsolete machinery and no known content. It was able to do its job as a litmus paper and like one, however useful the finding was there was no need to keep it after the information has been retrieved.

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[46] DC Video. *Sony 2" Video*. Accessed on 13 October 2010 at <http://www.dcvideo.com/obsolete-video-formats/2-inch-sony-helical.html>

[47] Sentiment and information gathered from interviewing commercial vendors at the AMIA 2010 Conference in Philadelphia, November 5, 2010.