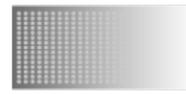
GROUP 47

Introduction to **DOTS**

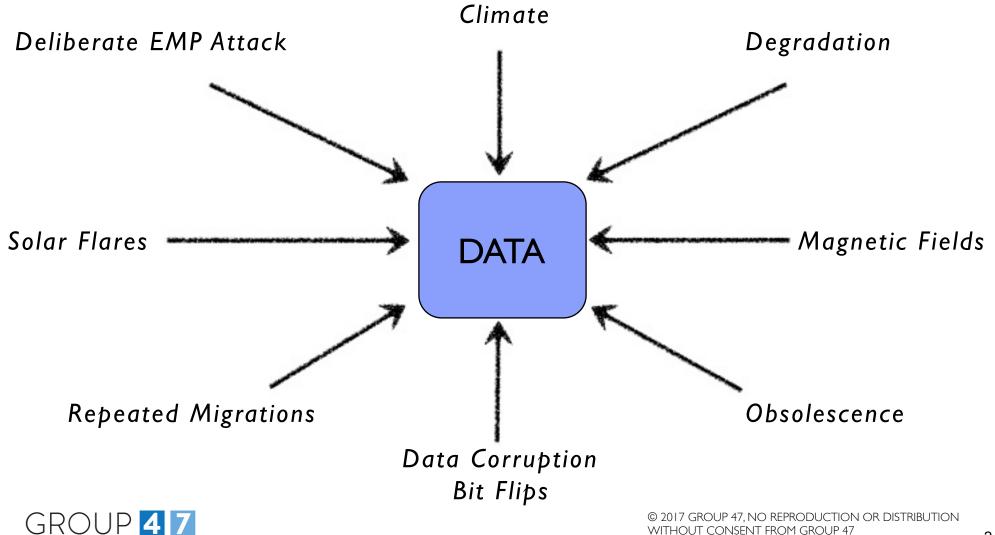
100 Year Digital Archiving Safe From Malware & EMP Attacks

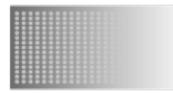
September 19, 2017





Current methods for archiving digital data on magnetic media create risk and uncertainty...





The Key to Successful Archiving



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Throughout history, all successful archiving has used media where you can **SEE** the information



small, to initiatence anyone in any way, however trivia. "Then you will come back here, go to bed, and sleep all night. You will awaken in the morning as usual, free of all hypototic suggestion. So that as you open your eyes, all your knowledge of the twentieth century will light up in your mind again. But you will remember your walk. You will remember your walk. You will remember your walk. Now... let to. And sleep."

I was empartasee; the moment I wore op in the second secon

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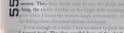
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nd energetic, a little too restless to take a walk. It was still snowin id, I'd been indoors too long, and I reathing chill fresh air; and I walked aat, chest protector, boots, and my

ΓΕΝΗ Ο Ε Ο Ε ΑΠΕ ΧΡΙΘΗΑΥΤΟΙ Ο Ι Ο Α ΑΙΗΝΑ ΜΗΝ ΧΕΓΟ ΥΜΙΝΟΤΗΤΑς Ο ΠΟΙ Ο ΝΤΗΝΑΜΑΡΤΙΑΝΣΟ ΤΧΟ Ε somehow glad to encounter no one, heard someone on the stairs I think heard someone on the stairs I think ie. Downstairs I walked out of the sut saw not a soul-tonight I didn't toward Central Park just across the onderful night. The air was sharp in ally caught in my lashes, momenhead, already misty in the swirls of

and with the curbs unmarked h I it and walked into the park. There I simply avoided bushes and trees, seven or eight inches deep now. It to too far from the lights of the street turned to look back. The streetlamp il see my own footprints in their light y quickly and I knew that in only



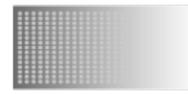
logged wit

It was enough of a walk, I had no desire to pash on into the park, and I turned back. The shim parallel lines of the sleigh runners were still there, down the middle of Central Park West, but they were fading quickly, and my own earlier footsteps were already completely gone. climbed the stains of the Dakots, took off my cap and cost, then turnes climbed the stains of the Dakota, took off my cap and coait, them turned off the biring come iser, randy for bed. Wailcot the twinknown for one last look costide. Then I wanted to feel the mose ence more, and I optimel the frinch, windows, and strepped out ento the balcory. Down on the street I'd coasted, the marks of the sleigh runners and of my steps were goors, the nous lovel and aumaticated conce more. I stated into the Mark and white park for several moments, then turned to look north, All I coalt see, burthy valible through the curation from you, was the down lighted, then I turned back lands the biring room. In bod I fell steeps and market.

GROUP 47

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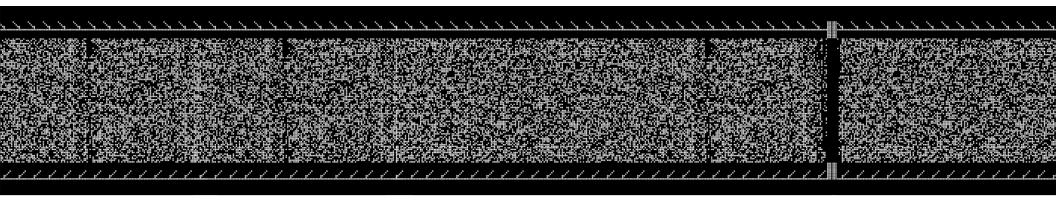
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The Digital Archive Solution



DOTS - Digital Optical Technology System



The *only* digital storage media that stores data visually, and can be easily retrieved with a camera.

*Low resolution example of data on $\frac{1}{2}$ " tape



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DOTS is Revolutionary in its Simplicity



A photo of a test write to DOTS media, illustrating the ability to write binary, text, and images.



UNIQUE SOLUTION

DOTS is unlike **ANY** current form of digital storage. Data is recorded visually on metal alloy tape similar to old paper computer tapes, but at a microscopic density that rivals the capacity of current magnetic tapes.

UNMATCHED ARCHIVAL LIFE

DOTS is archival for no less than 500 years. It is non-magnetic, chemically inert, immune to electromagnetic fields (including EMP), and can be stored in normal office environments or extremes ranging from -9° to 66° C (16° to 150° F).

PLUG & PLAY COMPATIBILITY

DOTS drives and tape cartridges will be identical in dimension to industry standard LTO form factors, and will be "plug compatible" with existing tape archiving systems, including robotic tape libraries and support for LTFS.

GAME CHANGING

DOTS will disrupt and transform the digital archiving market by eliminating the need for current practices of making new copies of magnetic media every 3 to 5 years in order to preserve 100% of targeted digital assets.

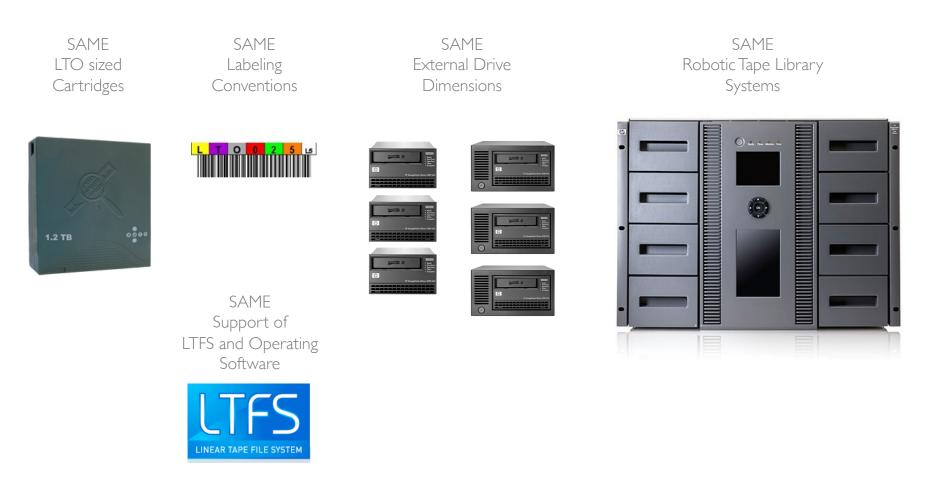
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Pragmatic Design for the Group 47 Solution ACCELERATING ADOPTION

The Group 47 Solution is designed for **DOTS** to be "plug & play compatible" with the existing LTO tape-based archiving systems & workflow

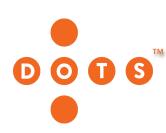




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DOTS and Group 47





Over **\$120 million** of R&D invested by KODAK to successfully develop, manufacture, test, and validate **DOTS** archival technology for Intelligence Community.

In spite of technical success creating a solution, when **DOTS** was ready for manufacturing, KODAK shuttered **DOTS** due to concerns of film sales being "cannibalized" by **DOTS**.*

GROUP **4**7

Group 47 was formed to acquire the **DOTS** technology from KODAK, improve upon it using current off-the-shelf technologies, and bring it to market.

Group 47 acquired:

- All 36 related **DOTS** patents
- All Trade Secrets
- All Project Documentation
- Complete Detailed Manufacturing Procedures
- Unobstructed access to past and current Kodak employees who worked on **DOTS**



* Contained in documents acquired by G47 PROPRIETARY

	N						
· · ·	United States Patent Rosen	. ,	tent No.: US 9,208,813 B2 te of Patent: Dec. 8, 2015				
54) 71)	DIGITAL OPTICAL TAPE STORAGE SYSTEM Applicant: Group 47, Inc., Woodland Hills, CA (US)	USP	(12) United States Patent Rosen	(10) Patent No.:(45) Date of Patent:	US 9,508,376 B2 Nov. 29, 2016		
2)	Inventor: Daniel Scott Rosen , Thousand Oaks, CA (US)	See a	(54) ARCHIVING IMAGERY ON DIGITAL OPTICAL TAPE	,	369/100, 112, 122; 358/474, 358/487; 347/239, 255		
			 (71) Applicant: Group 47, Inc., Woodland Hills, CA (US) (72) Inventor: Daniel Scott Rosen, Thousand Oaks, CA (US) 	See application file for (56) Reference U.S. PATENT I			
			(73) Assignee: Group 47, Inc. , Woodland Hills, CA	4,661,941 A * 4/1987 B	3ell G11B 7/0031 347/248		

First NEW Patent granted by U.S. Patent Office with multiple claims covering Group 47's unique visual approach for writing and reading digital data.

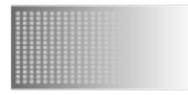
A vast improvement over KODAK's original design.

The second NEW patent granted covers Group 47's method for archiving images (whether images of photos, videos, or documents) that removes all file format dependencies.

The new method for archiving images and sound has quickly become one of the most compelling aspects of **DOTS** for all potential customers, since, with it, **DOTS** can guarantee image and sound files can be read securely decades into the future, without concern for operating system.

A third patent has been granted, and six additional patents have been filed

GROUP 47



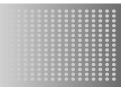
Long-Term Digital Archive Options Magnetic Media vs. DotsTM



Archiving on Magnetic Media	Archiving with DOTS
• Record to magnetic media	Record to DOTS media
• Store in a climate-controlled facility	 Store on a shelf at ANY temperature from 15° to 150° F
 Monitor disk integrity and check tape regularly for degradation & re-pack 	• DONE
• Migrate the data before magnetic data loss	
 Risk of data loss / corruption due to media degradation, migration, hardware obsolescence, EMP, solar flares, etc. 	
• REPEAT EVERY 3 – 5 YEARS	



High Energy Costs of Magnetic Media Archiving



Data centers with multi Petabyte disk arrays require massive A/C

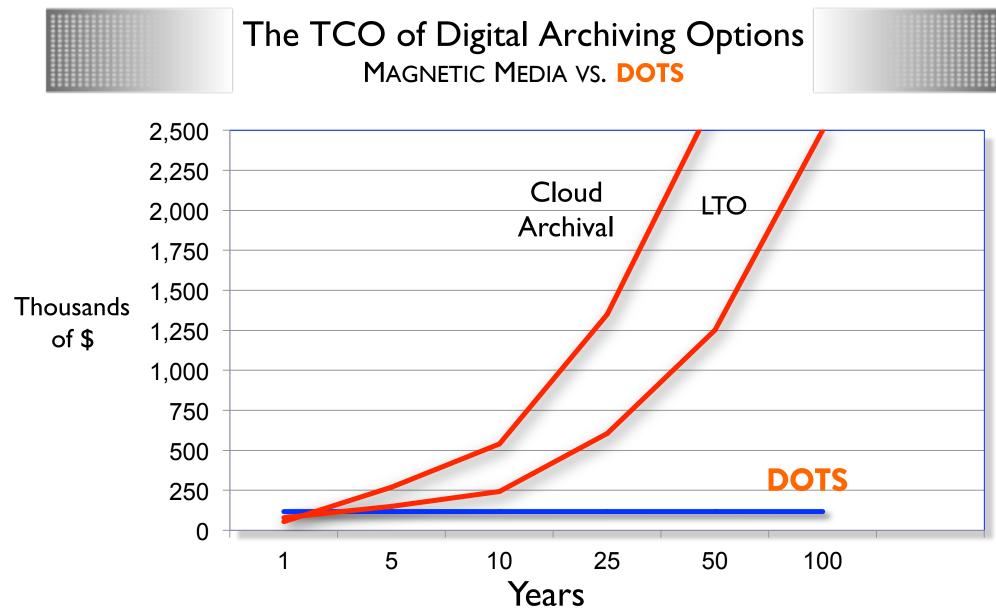
"Energy costs will emerge as the second-highest operating cost in 70% of worldwide data center facilities." Gartner, Inc.

For every watt currently consumed by a data center, it requires 70% more energy to cool the equipment.

Data Center Energy Efficiency, ©2016 The Mitre Corporation

In 2012, the Federal Government spent \$25 Billion in IT costs alone to maintain "Cold Data." Another \$20 Billion plus was spent to power and cool that data. Federal Government Source





Parameters Based on 2017 Analysis

- 1) Magnetic media requires a controlled environment (temperature and humidity). Archival storage vaults for magnetic media have an average monthly cost of \$3.09/cu. ft. of storage, due to the stringent environmental controls.
- 2) DOTS and LTO cartridges are approx. .0083 cu. ft. in size.
- 3) Based on information from a major storage vendor, their cost to migrate one magnetic tape cartridge is \$75.00 plus the cost of the media.
- 4) For this comparison, we are assuming 1 Pbyte of data, a cost of \$50 per LTO-5 tape and \$140 for DOTS, and that each tape is filled to capacity. Amazon Glacier storage assumes no data access. No accounting for inflation.



GROUP 47 Executive Leadership





Steve DeWindt Chairman & CEO

Senior operating & management executive with strong global P&L management experience & proven track record of driving market share & revenue. Many senior positions including Chairman & President OptionEase; CEO Sparxent; EVP & COO Celergy Networks; President Computer2000; CEO Ameriquest Technologies; President BlueRoads; Director Worldwide Sales Intel.



Has held senior positions at Disney, DreamWorks, SONY, Warner Bros., Technicolor. Recognized leader on motion picture technology, preservation and restoration. Member of Motion Picture Academy's Science and Technology Council.

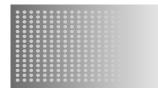


Dan Rosen CTO

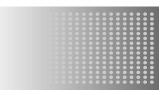
TRW, Lead Engineer designing and developing weapons, image processing, and intelligence systems for Dept of Defense, DIA, CIA, NSA and other agencies; DALSA Digital Cinema; VP Technology, Warner Bros.; CTO, Kodak's Cinesite; Chief Engineer DreamWorks Animation.

For detailed executive bios go to: <u>http://group47.com/about-us/</u>





Central Intelligence Agency



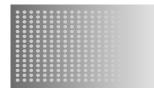


Excerpts from the Request for Proposal that led to a contract for a proof of concept of **DOTS**

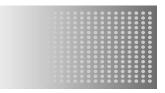
"...This digital record retention storage and archival system requires the capability to be stored in a normal office environment with extreme temperatures..."

"…Additionally this digital record retention storage and archival system requires the capability to be archived for no less than 100 years, non-magnetic, chemically inert, and immune from electromagnetic fields including EMPs."





Central Intelligence Agency





DOTS Can Save the Federal Government Billions in Power and HVAC Costs for Maintaining Cold Data

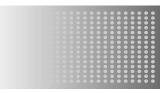
Intelligence Community is archiving approximately 800,000 Terabytes a week – <u>that is \$80 million in media alone per week</u>.

- "Kings Ransom" is being spent on migration and HVAC to preserve Cold Data
- Want to be at the front of the line when DOTS hardware and media become commercially available





Central Intelligence Agency





Doug Wolfe Deputy Director Science and Technology

- Group 47 successfully completed DOTS proof of concept contract, and was awarded payment on completion in Mid-2015. [Video of proof of concept project is available from Group 47 upon request.]
- In reference phone call with Iron Mountain, Doug Wolfe, as CIA CIO, stated DOTS had been proven to work.



National Archives and Records Administration [NARA]



Mike Wash Chief Information Officer



- Worked successfully on behalf of the Intelligence Community to get DOTS officially recognized by the Archivist of the United States as an approved archiving solution [Enabled Federal Government to issue contract to Group 47 for proof of concept of DOTS technology]
- Has estimated that there is a pipeline of 1.2 Zetabytes [1,200,000,000 Terabytes] of digital assets from the last 30 years flowing into NARA for archiving – <u>that is \$120 billion in just media</u>



National Archives and Records Administration [NARA]



- On reference call with Iron Mountain, Mike Wash [Former CIO of NARA, Now CTO of Bureau of Engraving and Printing] made these points:
 - DOTS is only solution that offers both stable media and the assurance that data can be interpreted at any point in the future.
 - Reaffirmed estimate that NARA has over 1.2 Zetabytes [1.2 Billion Terabytes] of digital assets from the last 30 years that need to be migrated and stabilized on DOTS media.
 - At I.2 Terabytes per future DOTS cartridge, the government would need no less than 2 billion cartridges – Two copies for long-term storage in separate geographical locations, and Wash says there's a strong case for a third copy as the access copy.



GROUP 47



<u>Contact</u>

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Jimmy Kemp

EVP, Federal Systems Group 47, Inc. Washington, D.C. Mobile: +1-202-439-3654 jimmy.kemp@group47.com

