Digitization in the Real World
Lessons Learned from Small and Medium-Sized Digitization Projects

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The In-House Digital Laboratory: Possibilities and Responsibilities

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Abstract
The Gruss Lipper Digital Laboratory at the Center for Jewish History has been building sustainable digital collections since 2005. It has worked on more than 100 different projects and digitized a wide variety of materials. This chapter highlights projects that include the digitization of books, photographs, and archival collections. It covers digitization from start to finish, touching upon the selection of materials for digitization, digitization practices and workflows, the management of digital assets, online delivery and users’ reactions to digital collections. It concludes with a discussion of the feasibility of an in-house digital laboratory for archives and libraries in general.

Keywords: Digital asset management, Digital imaging, Digital laboratory, Digital preservation, Digitization, Digitization projects management, Digitization standards, Metadata, Sustainable digital collections.

Introduction
The Gruss Lipper Digital Laboratory at the Center for Jewish History was established in 2005 with the generous support of the Gruss Lipper Family Foundation. Today, the lab is at the center of a digital program whose mission is to preserve the digital assets of the Center and its five partner organizations and to ensure long-term access to them. Since 2005, the digital lab has been involved in more than 100
digitization projects and has created more than 68,000 high-quality digital images. It has also created 300 hours of high-quality digital audio files by digitizing oral histories and Sephardic music stored on cassette tapes and reel-to-reel tapes.

The digital lab manages all digital assets via ExLibris’ DigiTool, a digital asset management system for libraries and archives (http://www.exlibrisgroup.com). The public interface is CJH Digital Collections (digital.cjh.org). The digital collections are an integral part of the Center’s Online Public Access Catalog (catalog.cjh.org). This catalog provides access to the Center’s and partners’ archival collections and library holdings. If a digital reproduction exists in CJH Digital Collections, the respective catalog record links to them. As of December 2009, 21,000 digital objects were accessible. In 2009 alone, 174,000 users requested digital objects. All materials are accessible to the public free of charge and the collections are constantly growing.

This chapter will examine a variety of projects. They illustrate approaches to the digitization of different types of materials: books, photographs, and archival collections. This chapter will also discuss digital asset management, online delivery, users’ reactions to digital collections, and the feasibility of an in-house digital laboratory.

The Gruss Lipper Digital Laboratory

The Gruss Lipper Digital Laboratory (digital lab) is a department within the Center for Jewish History.

The Center for Jewish History is the home of five prominent Jewish institutions dedicated to history, culture, and art. They are the American Jewish Historical Society (AJHS), the American Sephardi Federation (ASF), the Leo Baeck Institute (LBI), the Yeshiva University Museum (YUM), and the YIVO Institute for Jewish Research (YIVO). The combined holdings of the partner organizations bring together the rich variety of Jewish historical experience, ranging from Eastern European Jewry, Sephardic Jewry, German-speaking Jewry, to the American Jewish community.

The collections include more than 500,000 volumes, 25,500 linear feet of archival documents, and thousands of museum objects.
Since its opening in October 2000, over 40,000 researchers have visited the Center and roughly 210,000 patrons have attended various public exhibitions, conferences, and other events that the Center and partners held.

The Gruss Lipper Digital Laboratory, a department of the Center, collaborates with all five partner organizations in numerous ways by digitizing their collections, managing the resulting digital assets, and providing digital consultancy services. During the first two years of the lab’s operation it was fully funded through the grant from the Gruss Lipper Family Foundation. When this period ended in 2007, the Center made the digital lab an integral part of its functions and services and continued to offer the lab’s digital collections building services to the partner organizations. In order to defray some of the costs, however, the digital lab charges for its services whenever external funding becomes available to the partners. When this is not the case, the lab provides *pro bono* digitization services.

A typical digitization project starts with an idea put forth either by Center or partner staff. This is followed by discussions, examinations of materials, and following established procedures (including the completion of forms) to ensure that materials arrive in the lab that have been thoroughly vetted in regard to their value, physical condition, rights, and available metadata. Once the selected materials have been prepared and arrive in the lab, the process of digitization begins. Projects may involve one or multiple partner organizations.

**Projects**

When it comes to determining the value of materials, the lab works closely with partner staff. Value lies in the exceptional coverage of a topic, the uniqueness (scarcity) of materials, how well they represent the unique strengths of a partner’s collection, and their appeal to the partner’s and the Center’s audience. Materials must also be in the public domain or be orphan works (i.e., copyrighted works whose owner cannot be identified or located. See *Orphan Works*, 2009), or the partner must have permission from copyright holders to make
digital reproductions of them accessible online. Preservation needs also play a role in selecting materials.

Among the materials digitized in the lab are 137 Yiddish and Hebrew children’s books from the Yeshiva University Museum (YUM) and the YIVO Institute for Research (YIVO). The books document the development of Jewish children’s literature from the turn of the century until the onset of the Holocaust in Eastern Europe. The majority of the books are rare and only available at the Center. They are in the public domain or orphan works and could therefore be made accessible via CJH Digital Collections (digital.cjh.org). The project began as a pilot project funded by the Metropolitan New York Library Council (METRO) in 2007 and grew into a larger project when a private family foundation decided to fund the digitization of additional books. The Center also contributed the digital images to the International Children’s Digital Library Foundation which has made them accessible through its website.

In addition to children’s books, the digital lab has digitized rare books from the Leo Baeck Institute (LBI). The digital lab has been digitizing rare books since its inception. Funding has come from a variety of sources; originally from the Gruss Lipper Family Foundation, then from METRO and now through a private donor. Most recently, the lab digitized manuscripts from the 15-16th century pertaining to a famous Renaissance controversy between the Christian Hebraist Johannes Reuchlin and the anti-Jewish agitator Johannes Pfefferkorn, who advocated for the destruction of all Jewish books. The digital lab is ideally suited for the digitization of rare books. It is an in-house lab which reduces the risk of loss and damage that can occur during the shipping of books to external vendors. Moreover, the digitization staff is given the time to treat each book carefully and according to its often fragile or tightly-bound condition. This ensures that they are not damaged during the digitization process.

As for photographs, the digital lab has worked on dozens of projects during its first two years of operation, having digitized thousands of photographs (prints and negatives) as well as slides.
Among the highlights are 3,200 photographs of Moroccan and Turkish synagogues from the American Sephardi Federation (ASF).

The digital lab has digitized both portions of archival collections as well as complete collections. From the LBI, it has digitized rare oversize materials. They were selected due to their rarity and fragility. Among the highlights are letters of protection for Jewish communities in Germany from the 18th century. Letters of protection were issued to Jews by local authorities in Europe. These letters gave Jews the right to reside in a town in exchange for a special tax.

The digital lab has digitized a few archival collections in their entirety. The largest collection was from YUM. It consisted of 30 linear feet of materials, mostly fashion drawings by the New York City fashion designer Abe Grubère. However, this collection is an exception and archival collections digitized in the lab are usually small, such as the Raphael Lemkin Collection from the American Jewish Historical Society (AJHS) that consists of 7.5 linear feet. Raphael Lemkin was a scholar who coined the term “Genocide.” He was instrumental in the United Nations’ adoption of the Convention on the Prevention and Punishment of the Crime of Genocide in 1948. The collection documents Lemkin’s lifelong effort to prevent genocide and lobby the United Nations to adopt an anti-genocide convention. In total, the lab digitized the content of 76 folders which translated into 4033 images. The materials were digitized as part of an initiative at the Center that culminated in a conference and an exhibition on genocide in 2009.

**Copyright and Fair Use**

When materials are selected for digitization the copyright status must be clear. As for the YUM and YIVO children’s books and LBI rare books, the books were either in the public domain or orphan works. They could be made accessible via CJH Digital Collections without restrictions.

With regard to the photographs of Turkish and Moroccan synagogues, however, the situation was more complicated. There was a subset of 500 photographs of the 3,000 total, taken in 1989, where the ASF and the photographer jointly held the copyright. The
photographer was then consulted for his permission to digitize the photographs and to make the digital reproductions accessible online via CJH Digital Collections. His permission was obtained by means of a license agreement.

As for the Raphael Lemkin Collection, the AJHS had permission from Lemkin’s heir to make digital reproductions of the collection accessible. Among the selected materials was much correspondence from third parties. They were letters from various activists to people, committees or organizations that had the power to influence the United Nations or various governments to adopt and/or ratify the convention. The letters were protected by copyright. AJHS and the Center started to contact copyright holders and permission was granted whenever possible. We also reviewed the four factors of “fair use” and concluded that the factual nature of the correspondence and our intended use allow for making the letters accessible to the public for “fair use” (see Fair Use, 2009). Each digital folder containing letters was associated with a "click through" copyright notice, outlining the allowed terms of “fair use” such as that no use other than research, teaching, and private study is allowed without prior permission from the copyright owner. Copyright owners not properly identified, or any user with information on the copyright status of a particular work, are asked to contact the Center and AJHS so that appropriate information can be provided in the future. Every user desiring access to the digital materials must agree to these terms by clicking on a button before gaining access to them. The fair use information can also be found in the descriptive metadata record that is attached to each letter and at the bottom of the CJH Digital Collections website.

Image Capture

The Gruss Lipper Digital Laboratory has the following equipment: A BetterLight Super 8K-HS digital scanning camera back and a Mamiya 645ZD 22 megapixel (5,336 x 4,008 pixels) medium format single-shot digital camera. The scanning workstation consists of a motorized AIAXact 3040 DV copystand, four Buhl HID 150W 4k softcube lights
as well as two book cradles. The lab also has an Epson Expression 10000 XL Photo flatbed scanner with transparency adapter and a Minolta DiMage Scan Multi PRO AF-5000 multi-format film scanner. The digital lab also has a TEAC 860-R cassette deck, an Otari Mx-5050bII reel-to-reel tape machine, and a Behringer UB502 mixer. This equipment allows for the digitization of the different types of materials found in archives: Bound books, unbound materials, oversize materials, photographs, film, slides, transparencies, cassette tapes and reel-to-reel tapes.

When the digital lab receives a collection to be digitized, it tracks the collection, item, and images eventually to be created from the item in a Microsoft Access “tracking” database. For the actual digitization, the digital lab follows standards established by the National Archives
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*(Technical Guidelines for Digitizing Archival Materials for Electronic Access: Creation of Production Master Files – Raster Images, 2004)* which include guidelines for the creation of high-quality archival master images, quality assurance and accompanying metadata. As these guidelines recommend, each image contains a color scale and gray scale as color and tone references and a ruler as a reference for the size of the original document. Depending on the original, the digital lab produces 400 ppi 8-bit grayscale, 400 ppi 24-bit color, or 600 ppi 1-bit bitonal TIFF images with LZW or ITU-T compression. In terms of resolution, photographic prints and film pose an exception. It is determined by the size of the original and a minimum number of pixels needed to produce a high-quality image. 8-bit grayscale images are tagged with a Gray Gamma 2.2 profile, 24-bit color images with an Adobe RGB (1998) ICC color profile.

Recommended technical and administrative metadata that is not embedded automatically during the image capture process in the TIFF image is added to fields in the TIFF header via Adobe’s Photoshop software, such as the name and title of digitization staff, scanning facility (Gruss Lipper Digital Laboratory), organization (Center for Jewish History), and contact information.

The TIFF images are not post-processed. The goal is to create a digital archival master file that reproduces the original as closely as possible. During the quality assurance process, the TIFF images are inspected for orientation, sharpness, color, contrast, noise, and dust. Images failing this inspection (images that are skewed, out of focus, over- or underexposed, show digital noise, dirt, or dust) have to be rescanned. Access copies for web delivery are created either in the JPEG2000 or PDF format. JPEG2000 is a format that has an efficient compression rate allowing for the online delivery of high-resolution images into which users can zoom to appreciate fine details. This format works well with illustrated children’s books, rare books and oversize materials as well as photographs. At the maximum zoom level, the full resolution and detail of the JPEG2000 image can be appreciated.
For collections consisting of mostly type-written materials, such as the Raphael Lemkin Collection, the delivery format is PDF. The files are small and load quickly and the full text of each type-written document is searchable thereby allowing users to quickly search the content of a digitized folder by keyword.

**Metadata**

The Gruss Lipper Digital Laboratory records descriptive, administrative, and structural metadata via a variety of community standards. It has adopted MARC 21 (*MARC Standard*, 2010) as the standard defining the structure of a catalog record and AACR2 (*Anglo-American Cataloging Rules*, 2005) as a content standard. The standards are justified since MARC records already exist in the Center’s library catalog for many of the items digitized in the lab. They can easily be imported into the Center’s digital asset management system using the Z39.50 protocol. The staff of the Center and Center’s partners consists of trained librarians who update records when needed.

If records are created from scratch and do not yet exist in the Center’s OPAC, the digital lab recommends DACS as a content standard. DACS (see *SAA: Describing Archives: A Content Standard*, n.d.) was not conceived with the space constraints of a library catalog card in mind and therefore eliminates many of the abbreviations present in AACR2, making it a more user-friendly standard in an online environment.

The lab has used MODS (*Metadata Object Description Schema*, 2010) for selected projects, but has not yet officially adopted that standard. The lab has developed cataloging guidelines for a MARC 21 digital collections minimum record and a MARC 21 digital collections core record.

The MARC digital collections minimum and core record are based on the idea of levels of description as put forth in DACS, with the minimum and core record roughly corresponding to DACS’ single-level minimum and single-level optimum/added value descriptions. Particularly important is the use of controlled vocabulary. Controlled
vocabulary allows for the building of browsing categories in the Center’s digital collections portal, CJH Digital Collections (digital.cjh.org). These virtual collections allow users to search for relevant materials across collections and partners. Controlled vocabulary also ensures that a user retrieves all relevant materials when searching by keyword. Subject headings are taken from the Library of Congress Subject Headings (LCSH), Thesauri used are the Art and Architecture Thesaurus (AAT), and the Thesaurus of Graphic Materials (TGM).

The virtual collections in CJH Digital Collections are based on type (the lab uses genre terms to build the “collections by type” browsing hierarchy, such as “children’s books,” “drawings,” “photographs,” etc.), repository (the Center and its five partners), and provenance (title of a collection). Most recent research recommends organization by subject (Schaffner, 2009). The lab has begun this type of organization for a selected set of photographs from YIVO (subjects are Holocaust, political life, Yiddish theatre and others).

A “collection by type” to be highlighted is “archival finding aids.” CJH Digital Collections hosts 8,200 EAD finding aids, many of them converted from MARC as part of a recently completed project. Our goal is that eventually all finding aids will link to digital objects, if the archival collection has been digitized. These finding aids constitute an additional access point to the digital objects.

Finally, the digital lab also uses OAI-PMH, the Open Archives Initiative Protocol for Metadata Harvesting. The use of this protocol allows for the harvesting of all MARC records in CJH Digital Collections by OAIster, a union catalog of more than 23 million records from more than 1,100 contributors. OAIster records are freely available through WorldCat.org.

**Creation of MARC Records**

When MARC records already exist in the Center’s OPAC, as it is the case for all rare books from the LBI, they are imported into the lab’s digital asset management system and adjusted in terms of genre terms
and provenance to ensure they appear within the appropriate browsing category in CJH Digital Collections.

For some of the children’s books from YUM, MARC records did not exist in the Center’s library catalog. YUM, as the only museum among the Center’s partners, has its own database that is separate from the Center’s library catalog since museum objects follow different rules for description. For these books, a children’s book MARC record template was created in DigiTool which was used by the lab’s metadata librarian who cataloged the children’s books based on the information available in the museum database. For the ASF photographs that were digitized by the digital lab, just as with the YUM children’s books, no MARC records existed in the Center’s OPAC. In general, not much information was available for them, which is not a surprise since photographs that are part of archival collections are rarely cataloged on the item level. The little information partners usually have about photographs at the point of digitization, call number, dimensions, rights and repository that owns them, is generally transferred to the lab’s tracking database. Once digitization is completed, the data is exported from the database and converted into MARCXML and together with the images, ingested into the Center’s digital asset management system. These MARC records with minimal description are designed to be enhanced, based on the lab’s cataloging guidelines by partner catalogers once they have obtained the missing information, such as title, date, and other added entries.

In addition to descriptive metadata, the digital lab also creates structural metadata. This type of data is necessary for complex objects such as books, archival folders, and archival documents that consist of more than one page. Structural metadata preserves the physical and/or logical structure of such complex/multi-page objects in a digital environment. It allows users to page through a faithful reproduction of the original online. The digital lab uses METS (see *METS Metadata encoding and transmission standard, 2010*) as the standard for structural metadata.
The structure or “structural map” as it is known in METS is determined by the physical and/or logical structure of a physical item. Re-creating structures for books is less complicated and time-consuming since pages are usually numbered and chapters exist. Much more time-consuming is the recreation of the structure of an archival folder. Description usually only exists on the folder level, but a structural map for a folder reaches down to the item level. How detailed the structural map will be depends on how much description is necessary to make the content intelligible to users.

University archivists reported during the More Product, Less Pixels session at the SAA Annual Meeting in 2008 that students were frustrated when working with digital archival collections with no item level description. In comparison to a physical folder which can be opened up quickly and paged through, students felt that it was more difficult to determine if the content of a folder was useful to them or not. They complained about an “online microfilm experience.” (see Session 49: More Product, Less Pixels: Alternate Approaches to Digitization and Metadata, 2008.)

Due to the relatively small size of the Raphael Lemkin Collection, the digital lab decided to facilitate users’ experience and to describe the content of each folder not only on the folder level but also the item level. Folder information came from the finding aid but the item level information was supplied by the digital lab’s metadata librarian. The results are extremely detailed structural maps. For example, the structural map of a digital folder containing correspondence consists of labels for each letter containing the name of the correspondent and date of creation, and all letters are organized by date.

Moreover, additional information that the lab’s metadata librarian gleaned from studying the letters and particularly Lemkin’s index cards and research notes was also incorporated. This was done by adding subject headings and added entries to the MARC record that is attached to each digital folder. Finally, AJHS personnel updated the finding aid with links to the digital folders.
File Management and Online Display

The digital lab manages all digital assets via the digital asset management system DigiTool, which has been designed for digital asset management in libraries and archives. It supports a variety of community standards and file formats including audio and video, supports complex objects, assigns unique and persistent identifiers to each digital image and metadata, supports basic preservation tasks such as tracking of changes to objects and metadata, saves this data as well as all other metadata in xml, and allows for digital asset management en masse, all of which reduces the risk of loss or digital obsolescence. The physical infrastructure of the digital repository is provided by a StorageTek FlexLine 210R storage unit. This storage unit currently contains 10 TB of RAID-5 storage, and a tape library system for daily backups to tape. Backup tapes are stored off-site. When it comes to storage and backup, the digital lab works very closely with the Center’s IT department.

DigiTool, while primarily a digital asset management system, also powers the Center’s digital collections portal, CJH Digital Collections. A variety of viewers allow for the display of all the diverse digital assets described in this chapter, such as simple objects like photographs as well as complex objects like books and archival folders. However, while the viewers are relatively sophisticated (offering zooming and rotation features, browsing by a thumbnail gallery or a table of contents created through METS), the interface cannot be customized beyond color schemes and fonts. External applications can be embedded, such as an Adobe Flash player, and whenever this is done, the Center’s web designer is of great assistance. However, one has to keep in mind that DigiTool was primarily designed to manage digital assets and not to create exciting web exhibitions.

User Experience

The digital lab has gained much experience in the creation and management of digital assets. Over the last four years, it has built sustainable digital collections based on its mission to preserve them
and to ensure their accessibility for the long term. However, creation and management of sustainable digital assets is only one side of digitization, the other is users’ reactions to digital collections. Since early 2009, DigiTool generates reliable usage statistics which the lab started to analyze. At the same time, the lab also joined the photo-sharing website Flickr (http://www.flickr.com/photos/center_for_jewish_history) and made user surveys available in CJH Digital Collections to obtain feedback.

Usage statistics for CJH Digital Collections reveal that on average in 2009, the site was visited by 14,500 users a month (ca. 470 people a day). Of course, certain collections are requested more often than others. Among the materials discussed in this chapter, the children’s book collection ranks the highest in terms of requests, having been requested by users between 30-70 times between March – December 2009. The Raphael Lemkin Collection and LBI rare books rank second, with 20-30 requests per folder or book during the same time period, with one rare book, “Juedisches Ceremoniel” standing out, having been requested more than 78 times. Photographs of Turkish and Moroccan Synagogues are among digital objects least requested (1-10 times during the same period). The discrepancies in requests can be explained by the newness of a project and their availability by several means of access. While the children’s books and synagogue photographs are projects that started three years ago, the children’s books project was completed only in 2009 when it was incorporated into a bigger children’s books digitization initiative. The children’s books are currently featured in a virtual collection dedicated to recently completed projects in CJH Digital Collections. They are also accessible through the website of the International Children’s Digital Library Foundation and 14 of them are available on Flickr, as is the “Juedisches Ceremoniel.”

The Raphael Lemkin materials are accessible online in their entirety only since September 2009. However, the number of requests is high due to the publicity they received in conjunction with the November 2009 Genocide and Human Experience Conference at the Center. In the course of the advertising campaign for this conference,
selected materials were featured on the conference’s home page and in a dedicated web exhibition.

While the original purpose of joining Flickr was to gain feedback from users (DigiTool does not allow for users to leave comments) it became clear quickly that Flickr is also a great tool to promote the Center and partners’ digital collections. The 189 images on Flickr (as of 11 December 2009) were viewed more than 12,300 times over the course of eight months. This means that on average, an image on Flickr has been requested 65 times. This is a much higher average number of requests for images in comparison to CJH Digital Collections. The lab was also contacted and asked if some images could be featured on a personal blog. Moreover, people responded to AJHS’ requests to identify unknown people in photographs. Among the people who offered their help was the great-granddaughter of one of the people featured in a photograph. Users tagged images with the occasional “that’s a wonderful image” remark. There were no negative remarks. Considering the feedback and number of requests per image, the Center and participating partners deemed the project a success and the uploading of images to Flickr and the administration of the Center’s Flickr site has become part of the digital lab’s services.

The surveys created to obtain users’ reactions to digital collections in CJH Digital Collections indicate that users are generally impressed with the high quality of the images and their delivery. They show that users sometimes get frustrated, citing an inability to find what they are interested in. Users also find it difficult to get a sense for the amount of material online, their content, and how they relate to one another.

From analyzing usage statistics, surveys, and reaching out to users through Flickr we have learned that it will become increasingly important to better promote digital collections, explain more clearly to users what our digital collections are about and how they should be used, and connect with users in new ways.
Conclusion

The Gruss Lipper Digital Laboratory represents an impressive investment on the part of the Center for Jewish History. During the first two years of its operation, a grant paid for the complete refurbishment of a room making it suitable for a digital lab, the purchase of first-rate digitization equipment, and a staff of five people (a director, metadata librarian, photographer, and two part-time digital asset production associates). At this point, the Center supports a staff consisting of two full-time and two half-time positions: one director, one metadata librarian, and two photographers/digital asset production associates. There are additional costs for necessary and continuous upgrades and investment into software, hardware, and data storage as digital collections continue to grow. The cost of continued education for staff as digital technologies evolve also has to be factored in. Finally, technical support that is lent to a digital lab by an institution’s IT department must be part of any lab’s budget considerations.

Because of these high costs, a state-of-the-art digital lab requires sustained support from stakeholders. These stakeholders have to have an understanding of the challenges that maintaining a digital program brings and an understanding of the basic concepts behind digital preservation. With this support and a professional and standards-based program for digital image capture and digital management as represented by an in-house digital laboratory, the groundwork is laid for the building of a trusted digital repository (RLG/OCLC Working Group on Digital Archive Attributes, 2002), the long-term goal of any digital program.

For the investment it represents, an in-house digital lab like the Gruss Lipper Digital Laboratory brings tremendous benefits. When developing new digitization projects an institution can draw on experienced staff. The digital assets remain under an institution’s control, they can be accessed at any time, and there are no access restrictions because rights to the digital images have not been given to a vendor. The high-quality digital images can be used for many different purposes, ranging from web exhibitions to printing and
publishing. The professional administration of a digital asset management system ensures that digital assets are managed safely and securely. No file is lost, even years after a project’s completion. Strict adherence to community standards ensures that files can be migrated to different formats if the need arises and that data can be exchanged with other systems. The result is digital collections whose hallmarks are usability, portability, and longevity.

There is much more to digitization than just image capture. It includes metadata, standards, digital asset management, online delivery and users’ experience, all of which require expert knowledge for creating useful and sustainable digital collections. If long-term preservation of digital assets is part of an institution’s mission and if that institution remains abreast of new digitization developments and technologies, an in-house lab is well worth the investment.

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