

CASE 18

Archiving Content from Mobile Devices: Challenges and Strategies

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CASE STUDY DATE: October 2017

ISSUE: This case study describes the challenges involved in archiving content from mobile devices, including the lack of equipment and software, and describes how staff at Northwestern University Archives overcame these obstacles and developed policies and workflows for transferring data from mobile devices.

KEYWORDS: Born-digital content
Electronic records
Digital preservation
Crowdsourcing
Legacy systems and media

Introduction

Northwestern University (NU) is a private research university founded in 1851 on the shore of Lake Michigan, twelve miles north of downtown Chicago. A leader in education and research, NU has a student body of over 20,000 students and devotes \$620 million annually to sponsored research.¹ NU is comprised of twelve schools and colleges and more than fifty research centers across three campuses: Evanston and Chicago in Illinois, and Doha, Qatar.

The NU Libraries hold more than five million volumes and fourteen terabytes of unique digital content.² Part of the University Libraries, the NU Archives was established in 1935 and holds a wide array of material relating to every aspect of Northwestern's history. Archives collections include official University records, papers of faculty members, records of student organizations, publications, photographs, audio-visual materials, artifacts, and more. NU Archives began collecting unique born-digital materials in 2011 and now holds more than 213 gigabytes of archival content, including faculty papers, records of student organizations, images, audio recordings, and websites.

Background

In 2012, NU Archives and Digital Collections participated in the Society of American Archivists "Jump In" Initiative. In a collaboration effort, staff from both departments oversaw an intern who created an inventory of all digital media contained in unprocessed University Archives collections, which was then used to determine resource needs for accessioning born-digital archival materials. "Jump In" at Northwestern unearthed a wide array of physical media now common in archives: floppy disks of various sizes, CDs and DVDs, and external storage devices. But the project also brought to light a type of media that is not usually seen as a source for archival materials: mobile devices.

Several cell phones, ranging from a mid-1990s Motorola to more recent smartphones, had been acquired by University Archives as part of donated collections. Until the "Jump In" initiative, they were treated as artifacts. However, the number of devices tallied during "Jump In" made staff reconsider the status of the cell phones. While early models from the 1990s may not contain much, especially after so much time, it is clear that newer mobile devices, especially smartphones or tablet computers, could potentially hold significant digital records.

In her 2009 article on this issue, Michelle Caswell comments that "While cell-phone-generated voicemail messages, text messages, still images, and video footage are often viewed as ephemeral, tailored to meet the needs of a fast-paced, 'disposable society,' cell phones can also generate records of enduring value."³ Certainly address books, photographs, and correspondence in analog form are all widely accepted types of records

¹ Northwestern University, "Facts: Northwestern, At a Glance," <http://www.northwestern.edu/about/facts.html>.

² Northwestern University Libraries, "Library Profile," <http://www.library.northwestern.edu/about/welcome/library-profile>.

³ Caswell, Michelle, "[Instant Documentation: Cell-Phone-Generated Records in the Archives](#)," *The American Archivist* 72:1 (Spring/Summer 2009): 135.

in archives, so shouldn't their digital forms – cell phone contact lists, images, and text messages – also be evaluated for archival value? After several more mobile phones were donated to the NU Archives in 2015, it was decided that the devices should be treated as digital media, much the same as floppy disks or external hard drives, according to the terms of the donor agreement. Laura Alagna, the Digital Curation Assistant, was tasked with adapting the NU Archives workflow for accessioning born-digital materials (see Figure 1) and transferring any content possible from the cell phones in our collections. Nicole Finzer, Digital Curation Librarian, and Kevin Leonard, University Archivist, provided guidance and support in this endeavor.

Figure 1. Born-digital archiving workflow adapted for mobile devices



Challenges to Transferring Content from Mobile Devices

However, two significant barriers were encountered before the workflow for archiving data from mobile devices could even be implemented. First, mobile devices like cell phones or tablet computers often require proprietary or obsolete peripheral equipment to transfer their contents; and second, methods of transferring data are highly device-dependent.

#UndeadTech

In recent years, USB connections for data cables or power supply units have become standard, but this was not always the case. Most devices manufactured before the mid-2000s utilized unique data or power connections, determined by the brand or even the individual device. Interoperability of data transfer and power supply cords between devices only became widespread after 2010, three decades into the life of the mobile telephone. Proprietary connections for data cables and chargers are much less common now, but manufacturers still produce some devices that require a proprietary connector.

NU Archives has acquired many orphaned devices over the years. The mobile devices have arrived in our collections without the necessary equipment to transfer their contents, even though the donors of these items intend for them to be treated as sources for archival materials, not as artifacts. But the long legacy of proprietary connectors in mobile technology made the lack of matching peripherals for our devices a difficult obstacle to overcome.

At first, the solution to this equipment problem seemed simple: we would locate the necessary cords or cables for the mobile devices in our collection and purchase them.

This quickly proved to be an impossible strategy, however. The orphaned devices in our collections were old enough that the matching peripherals were no longer being produced. Attempts to order from various online electronics marketplaces and even directly from manufacturers in China were met with “out of stock” messages, and the puzzled staff of our local RadioShack politely informed us that “sometimes you can find things this old at secondhand stores.”

Rather than comb through all the electronics bins at every thrift store in the Chicagoland area, we decided to bring the secondhand digital castoffs to us. Considering how many of our own colleagues confessed to having drawers full of old data cables and cell phone chargers that they no longer used, we decided to crowdsource the equipment for the orphaned cell phones, and #UndeadTech came alive.

To develop the #UndeadTech campaign, staff from University Archives and Repository & Digital Curation worked closely with the NU Libraries Marketing and Communication team. The help of Drew Scott and Clare Roccaforte was indispensable to the success of #UndeadTech. They brainstormed ideas for the campaign, developed its branding, wrote a project plan, and composed text for the main #UndeadTech webpage. Furthermore, they arranged for the #UndeadTech team to meet with various groups in the Libraries and across campus who would help amplify the message of #UndeadTech. Through the Libraries’ Marketing and Communication unit, the #UndeadTech team worked with members of the NU Libraries Social Media Committee and Preservation Department, as well as the NU Relations department and the Alumni Association. Throughout #UndeadTech, our colleagues in Marketing and Communication were frequently in touch with collaborators across campus, who used their own social media channels to promote #UndeadTech. In this way, the message of our crowdsourcing campaign reached a wide audience in our campus community.

#UndeadTech was live for a period of two weeks at the end of October 2015. Through social media and the NU Libraries’ homepage, we encouraged people to donate their undead technology via dropboxes placed at various locations across Northwestern’s Evanston and Chicago campuses. Due to our promotion efforts and those of our university colleagues, as well as the timeliness of the campaign—#UndeadTech was intentionally launched around Halloween in order to capitalize on the zombie theme used for the campaign’s branding—it caught the attention of a reporter at the Chicago Tribune.

In the middle of #UndeadTech, the story was published in the Chicago Tribune newspaper, on its website, and was promoted on its social media channels, which led to a landslide of additional attention. Members of the #UndeadTech team were also interviewed on WBEZ / Chicago Public Media, and the Tribune reprinted the story in several of its affiliate newspapers, including the Tampa Bay Times and the Los Angeles Times. Because of the media coverage, #UndeadTech went well beyond Northwestern University: donations of obsolete media equipment were mailed to us from across the country, and our team responded to over a hundred inquiries about the campaign via email, phone, and social media. Ultimately, we received over 300 data cables, power supply units, and other electronic peripherals, which were weeded and organized into a collection containing nearly 100 items, 38 of which are unique. Other equipment,

unrelated to the mission of archiving data from mobile devices, but useful for our digital archiving program nonetheless (including floppy disk drives and a Jaz disk drive), was also donated. NU Libraries was also awarded the John Cotton Dana Library Public Relations Award in recognition of #UndeadTech.

Due to the profound success of #UndeadTech, NU Archives was able to crowdsource a collection of data cables and power supply cords, addressing the problem of orphaned mobile devices. The collection was organized by types of connectors for data cables and voltages for power supply units. The latter were also tested using a voltmeter to determine that they were still in working order and that the labeling was correct on each of them, so that digital archiving staff in the future could be sure of using the right charger for a device's specifications.

Once the collection of electronic peripherals was organized and tested, Laura Alagna began working to transfer data from the cell phones in the NU Archives. The first device, an early 2000s model flip phone, could be charged with one of the power cords from #UndeadTech, but unfortunately no data could be recovered from it. When powered on, it displayed a phone number for the mobile carrier, which no longer was in service. Work on the rest of the devices proved more fruitful, but the second major challenge of archiving content from mobile devices quickly presented itself.

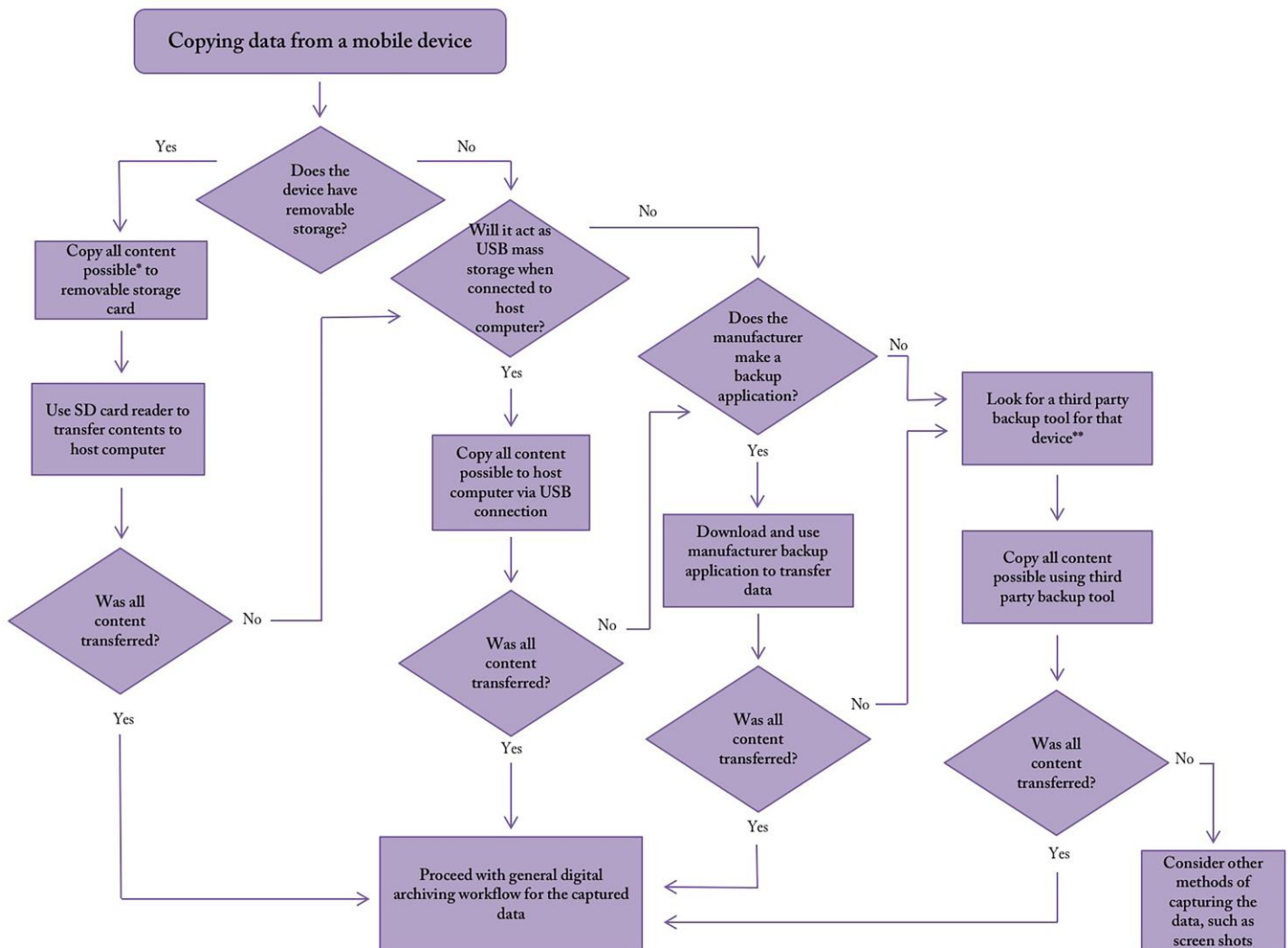
Device-Dependent Data Transfer

Once a mobile device is connected to a computer through a data cable, its contents can be copied to the host machine; however, the ease of this transfer is highly dependent on the features and operating system of the device. Some are equipped with storage cards that can be easily removed from the phone and accessed through an inexpensive memory card reader. Newer model smartphones are also often equipped to act as USB mass storage devices when connected to a computer. Both external storage cards and devices that act as mass storage can easily be treated as any storage device and their contents archived via the same workflow as for hard drives, disks, etc.

However, older phones, particularly “dumb” models, are frequently not set up for this function. Furthermore, even if a given device has removable storage or is designed to act as a storage device, by default only some of its contents are available to be copied to a computer. Media such as images and music are readily available to copy to a host computer, but other content that may have archival value—such as texts, emails, or contact lists—may not be immediately transferable.

At NU Archives, we developed several strategies to surmount this problem, which are illustrated in the decision tree below (see Figure 2).

Figure 2. Decision tree for transferring content from mobile devices



* The content transferred from each device may vary depending on the donor agreement; check with University Archivist to be sure all types of content (images, texts/emails, contacts, etc.) should be copied.

** Exercise extreme caution when downloading or using third party software; any tools under consideration should be thoroughly investigated for malware.

Many device manufacturers produce tools for their devices so that users can back up their own data, which can easily be used to copy data from mobile devices for digital archiving purposes. Proprietary backup tools frequently have options for the user to choose what types of content get transferred from the device to the host computer, so text messages, emails, and contact lists can be included. However, proprietary software for mobile devices may further complicate the transfer process by copying the content in a proprietary file format. This challenge was encountered by NU Archives when attempting to extract content from a BlackBerry using the BlackBerry Desktop Software tool.

If the manufacturer's software results in a proprietary file format, or if there is no backup application provided by the manufacturer, then third party tools can be useful. There's a

large number of software and apps designed for all of the major mobile operating systems (Windows, iOS, and especially Android). Some of these cost a nominal fee, but many are available for free download. Of course, as with any free software, the user must be wary of malware. With careful investigation and screening of downloadable tools, though, we have successfully copied data from both Windows and Android phones in the NU Archives using third party backup applications.

Finally, there may be some situations where transferring some or all of the data from a mobile device is impossible. While we were lucky that none of the cell phones in our collections allowed us to view content but not transfer it off the device, we did discuss what action we might take in that situation. It seems inevitable that at some point NU Archives will acquire a mobile device that will not allow us to copy all of the content that we wish to archive; therefore, we have developed a policy for that eventuality. If faced with a device that will not yield its contents for transfer, the staff member working on it will consult with the University Archivist to determine what lengths to go to in order to capture the content. The action to be taken depends on the nature of the content as well as the donor agreement. If the University Archivist deems the mobile device's content to be of high value for the NU Archives and/or the donor expressly wishes the content to be preserved, alternate methods of capturing the data may be pursued, such as screenshots or even transcribing information from the device.

Taking screenshots or transcribing information are undoubtedly extreme measures, given the amount of time they would take. But as a colleague on the #UndeadTech project team asked: if an archival collection contained an important record that was written on a Post-It note, or scrawled on a napkin, or on another preservation-unfriendly medium, wouldn't we use every method to try to preserve that record, including very time intensive methods? Thus, our workflow for transferring content from mobile devices includes the option to pursue other methods of data capture if all other strategies have been exhausted, and if approved by the University Archivist.

Analysis

Lessons Learned

Developing and implementing our workflow for archiving content from mobile devices at NU Archives has taught us some important lessons. First, overcoming the obstacles to transferring content from cell phones forced us to be very "out of the box" when coming up with solutions. Conventional strategies for working with obsolete media, such as simply purchasing the right equipment for the media in our collections, did not work for our mobile devices. So we turned to crowdsourcing for the solution to the equipment problem, which had the additional benefit of raising awareness, both in our university community and among the public, of our digital archiving efforts.

This attitude of being unafraid to look for solutions in unexpected places also served us well when faced with the challenges of transferring data from mobile devices. Successful methods of copying content varied significantly from device to device, so plenty of online research, problem solving, and tenacity was required. Online discussion forums as

well as mobile carrier and manufacturer help sites were the most useful resource in the effort to archive data from mobile devices. Ultimately a combination of both manufacturer-produced backup tools and free software developed by third parties was needed to transfer as much content as we could from the cell phones in our collections.

Second, collaboration was the main key to our success in both #UndeadTech, and the efforts to work with the mobile devices once we gathered the right equipment. Working with the NU Libraries Marketing and Communication team not only allowed us to amplify the message of the crowdsourcing campaign, but also made things run smoothly once #UndeadTech was covered by the media. Our colleagues in Marketing and Communication helped us develop all of the necessary components of the campaign, such as promotional materials and social media posts, so that #UndeadTech could continue to run while we were busy replying to media inquiries and messages from potential donors. In addition, through the Libraries' Marketing and Communication unit, we were able to establish relationships with many other departments and organizations on campus, which brought our message to a large audience outside of the Libraries.

Collaboration continued to be an important factor in successfully transferring data from the mobile devices in our collections. Once #UndeadTech brought public attention to our digital archiving efforts, many people with expertise in this area – mainly current or former employees of electronics companies and technology hobbyists – reached out to offer tips and ideas for additional resources. In addition to discussing the challenges of archiving data from mobile devices with people who contacted us because of #UndeadTech, we also used online communities for collaboration. When faced with software issues or other technological challenges, Laura Alagna used online forums, professional organizations like the BitCurator Consortium, and even Twitter to look for new ideas or strategies for transferring content from the mobile devices in our collections. Certainly neither #UndeadTech nor our resulting success in copying mobile content for the NU Archives would have been possible without collaborating with many different people across a variety of platforms.

Ongoing Challenges

Despite the successes we have had at NU Archives in transferring content from mobile devices in our collections, we anticipate more challenges ahead. First, there is the problem of mobile applications. Images, texts and emails, and contact lists can clearly be classified as archival records, but are there some application-based data that should be considered records as well? For instance, if a notable photographer primarily uses their mobile phone to take pictures, and Instagram is an important part of his or her career, should the repository that acquires his or her work attempt to archive the mobile version of that Instagram account? If so, how? The account can be captured via a web crawler, of course, but that does not solve the problem of how to capture the mobile version of the app. Many apps are increasingly only developed for a mobile platform, and significant features (as well as the “look and feel” of the mobile app environment) are lost when it is captured by a web crawler. Despite this, little information currently exists on how a mobile app may be preserved and made accessible over the long term.

More basic mobile device content, such as texts and contact lists, is becoming easier than in the past to backup or restore, but still presents ongoing challenges to the archivist. Manufacturers obviously do not have long-term preservation in mind when designing these features. Backup applications are targeted at consumers doing personal digital archiving, so these tools may not be suited to digital archiving in a professional setting. Even if there were demand for a mobile backup tool targeted at archival repositories, developing such an application would likely be difficult due to the variety of mobile devices—and the variety of operating systems for those devices—in use today.

Future Plans

It remains to be seen whether the policies described and lessons learned in this case study will be useful in the future. It is abundantly clear that archives will continue to acquire more and more born-digital content as time goes on. At the same time, we are all living more of our lives on our mobile devices, which are consistently growing “smarter” by the day. As archivists, can we expect these trends to collide, resulting in increasing numbers of mobile devices heading for our repositories? There are several factors that might preclude this, including the cost of the devices themselves (and thus a donor’s reluctance to part with an expensive belonging), and the rise of cloud storage. However, at Northwestern University Archives we expect mobile devices to be an important source of content for our digital collections and we are prepared to treat them accordingly with our mobile-specific policies and workflows.