Immortal Bits: Managing Our Digital Legacies

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An Ulster University student designed a website to help manage and deliver digital assets after death.

There comes a time in our lives when we think about "getting our affairs in order" in anticipation of our inevitable demise. This might entail gathering important documents in a secure place and coordinating access for family or friends. But now that many of our assets are digital—photos, videos, documents, bank accounts—how do we arrange secure access for our heirs? While a master's degree student at Ulster University, Mark Hetherington designed the My Digital Legacy Web service to meet both client and beneficiary needs.

MY DIGITAL LEGACY

My Digital Legacy clients, known as legacy users, can securely save links and passwords for storage services and social network sites, specify contact information for beneficiaries, and provide instructions about who can access which assets. This way, beneficiaries can retrieve digital assets in one place, rather than searching the Web. They can also create a memorial page for others to share memories about their loved one.

In addition, the website provides useful information to help educate the general public about digital legacy issues. Despite growing interest in this topic, Hetherington found that people underestimate the size and complexity of their intentional and unintentional digital footprints. Previous research found that the average individual has 26 separate Web accounts (www.dailymail.co.uk/sciencetech /article-2174274/No-wonder-hackers-easy-Most-26 -different-online-accounts--passwords.html). (Incidentally, the average individual also has only five passwords. But password security is a subject for another column.)

Online service providers' policies and practices following the death of users vary (see Table 1). Thus, My Digital Legacy lets the client specify how various assets should be handled, rather than relying on a collection of different policies.

Figure 1 shows the relationships between My Digital Legacy, its users, and other services. The legacy user creates an account and records the locations and passwords of other online services that hold digital assets. The user also registers beneficiaries and describes how digital assets should be distributed. When a beneficiary

informs the service of the user's death, the service contacts and retrieves digital assets from the other online providers, or requests that assets be deleted. These providers can then reclaim the space that was being used for the assets. Beneficiaries retrieve the assets from the service, and can create a memorial page.

TOP-LEVEL DESIGN

Figure 2 illustrates how My Digital Legacy's pages are organized. Legacy users and beneficiaries have separate login pages, which lead to user-specific activity pages. On the My Digital Legacy page, the public can access general information and tools for calculating their digital footprint. Page content is dynamic, generated by HTML5 and CSS3.

Account information is stored in a MySQL database, and PHP is used to access the database from the HTML pages. Information stored in the database is highly sensitive. All passwords are encrypted, and user input is carefully scanned and verified to prevent code injection. (Because this was a student project, reasonable security measures were included in the design. A commercial service, of course, would require a comprehensive security architecture.)

USER INTERFACE

The user experience is key to any website. A clean, elegant user interface encourages visitors to explore, return, and share their experiences on social media. The site must be easy to use and navigate. Because My Digital Legacy deals with a sensitive topic, it was especially important to project a calm, professional image to clients and the general public.

Figure 3 is a screenshot of the homepage, illustrating the interface's design features. The overall color palette is cool, dominated by shades of blue and gold. Such colors have been found to

PROJECT DETAILS

» Project: My Digital Legacy
» School: Ulster University, Northern Ireland
» Student: Mark Hetherington
» Faculty mentor: Cathryn Peoples

**TABLE 1.** Examples of online providers' various after-death policies.

Service type	Example policies
Social networking	Memorialize the page.
	Delete the account.
	Send content to family before deleting the account.
Email	Delete the account.
	Provide account information at provider's discretion.
	Provide a copy of emails and contact lists to family before deleting the account.
E-commerce	Close the account, and give any cash value to the estate.
Online dating	Block access to the account.
	Delete the account.
Photo/video	Delete the account and all content.
	Give all control of account and content to the estate.
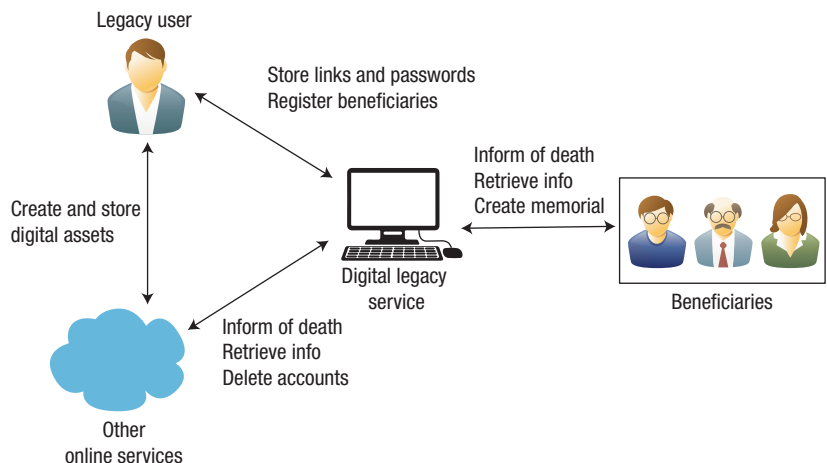
Figure 1. High-level interactions between My Digital Legacy, its users, and other online services.
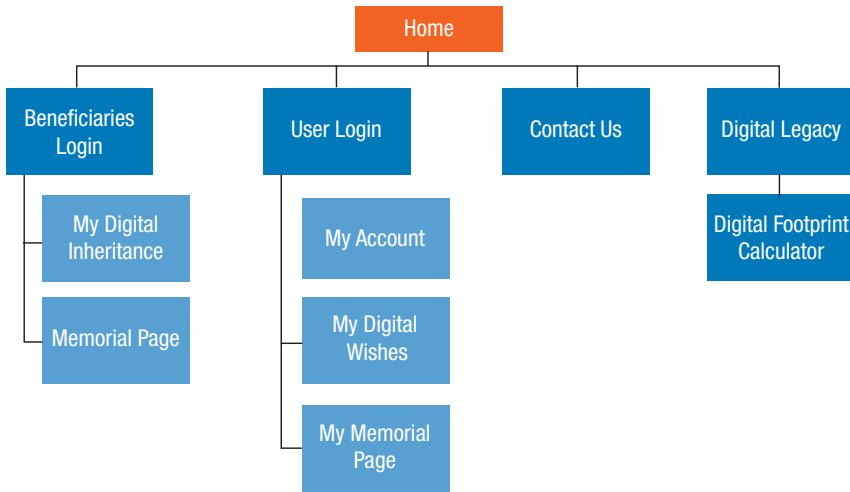
Figure 2. Site map of My Digital Legacy.
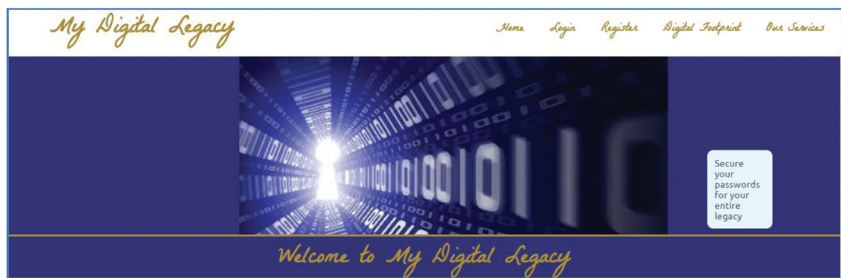
Figure 3. The My Digital Legacy homepage features a changing image gallery and a universal navigation bar.

Figure 4. The accounts page. Logically related data items are grouped together in boxes to promote a clear user interface.

encourage users to stay longer on a site.

To create a unified theme, the site uses only two fonts: a sans serif font (Quicksand) for block text and an elegant script font (La Belle Aurore) for headings and the navigation bar.

To promote ease of use, drop-down menus are generally avoided, and the universal navigation bar contains only a few links. Instead, guiding links are provided on the various pages, using context to anticipate user needs. User input is gathered through clearly labeled text fields and selection menus. Logically related data items are grouped together using fieldsets, as shown on the accounts page in Figure 4. Buttons change color when the mouse pointer hovers over them, emphasizing the sites' interactivity.

For pages that contain a lot of information or options, such as the homepage, a grid of flip-box links is used. The box's front display is a simple yet informative title and a related graphic. Hovering over the box with the mouse flips it over to reveal a more verbose message (see Figure 5). This allows the page to host a lot of information that's revealed only when the user is focused on a particular topic.

FUNCTIONAL DESIGN

Legacy users would likely access the following pages:

› *Registration:* Used to create a My Digital Legacy account. User information (name, birthdate, and email) is entered, as well as an initial password and a longer passphrase for recovering or changing the password.
› *Login:* Once users have registered, they use a typical login page to access the account.
› *Beneficiaries:* A single page allows users to add, edit, or delete beneficiary information, including name and contact information.
› *Accounts:* On this page, users

record information about accounts with various online providers. Well-known sites such as Gmail and Facebook are prepopulated in the table, and users fill in their login information for each site. Users can easily add new sites. For each account, users can designate a beneficiary, as well as an action to be performed on that account.

› *My Digital Legacy Account:* Users can manage their password and other information associated with the service.
› *Design Memorial:* Users have the option to design a memorial page that includes either an image or video at the top, followed by information about the deceased. They can also include a guest book that lets visitors record their memories.

At this time, only the legacy user pages have been implemented. Detailed design and implementation for beneficiaries and the general public pages will be addressed in future work.

OTHER DIGITAL LEGACY SERVICES

Although Mark Hetherington is no longer with Ulster University, his research on digital legacies continues. To participate in his survey on the implications of online activities after death, see http://goo.gl/forms/wFreGEFL8s.

Other current services related to digital legacies include

» Secure Safe (www.securesafe.com), which offers a Data Inheritance feature that allows users to register beneficiaries to receive their digital assets and other important information, such as insurance documents;
» Protect Their Memories (protecttheirmemories.com), which will remove and delete accounts on a collection of popular social media sites, such as Facebook and Twitter;
» The Digital Legacy Association (digitallegacyassociation.org), which helps healthcare providers support clients with digital end-of-life planning and digital legacy issues; and
» Death and Digital Legacy (deathanddigitallegacy.com), which provides news

SUBMIT YOUR PROJECT

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An aging population combined with growing use of digital media and other assets make this an issue that will only increase in attention and importance. The market has begun to respond (see the "Other Digital Legacy Services" sidebar), and we should expect to see more such services. In fact, digital memorialist appears on a list of potential future career opportunities (http://careers2030.cst.org /jobs), along with robot counselor, wearable technology specialist, and healthcare navigator.

Many nontechnical issues must be considered for such a service. The legal issues involved with digital asset access, ownership, and control are complex and vary widely among jurisdictions. The security implications, including authentication and identity verification, are profound. In addition,

repositories of sensitive information such as passwords are prime targets for criminal hackers.

Cleaning up our digital presence after death has long-term societal benefits. Removing assets from online service providers will allow the space to be reused. This might seem like a minor issue given the volume of data, but it's estimated that the number of Facebook users who have died could match—and then exceed—the number of live users around 2065 (https://what-if.xkcd.com/69). In addition, inactive accounts can be exploited for fraud and identity theft.

My Digital Legacy is an ambitious effort to satisfy several different needs with one service. Similar services will likely emerge to help us manage our legacies, preserve what's important to us, and plan for

(a)   **(b)**

Figure 5. Example flip-box feature of HTML5 and CSS3. (a) The front of the box shows a simple title and image. (b) The back is revealed when the user hovers the mouse over it.

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