
Free Data Interfaces: Taking Human-Data Interaction to the Next Level

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Abstract

As a response to the call for theoretical perspectives on how to move human-computer interaction closer to the human and remove barriers to flexibility, I outline that a key part of the solution involves changing the way we model, and think about, our data – that we must build for the totality of individuals’ digital lives, and in recognition of the increasing complexity that keeps our data scattered and trapped within data formats, services, devices and file formats. We must create a new genre of *free data interaction* interfaces that allow productive interaction with our personal data at an abstracted, platform- and technology-independent level. Data should be indexed represented with proxies where needed rather than favoring centralized storage. Interaction metaphors such as lifestreams, semantic dashboards and locational interfaces are proposed. Technologists and designers must work together to build useful applications that users can operate at a semantic, not technology-centric, level.

Author Keywords

empowerment; human-data interaction; ubicomp; lock-in; seams; separation of concerns; semantic analysis; abstraction; humane design; digital life; personal data; semantic dashboards; lifestreams; semantic application platform; free data interface.

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What is a Free Data Interface?

A free data interface is one that allows a user to see all their data in one place. It is an interface that works at the level of human life, not confined to the limited scope of a single technology or provider.

Principles

1. Human convenience takes priority over commercial motives
2. Human convenience takes priority over technical ease
3. Recognize and embrace the complex, scattered nature of our digital lives.
4. Use representative proxies for data when it is inaccessible, so that interaction is still possible.
5. Where barriers exist, such as commercial service limitations, they should be highlighted, with their cause, so that providers are held to account and users are better informed.

The Problem: Data Gets Trapped

In order for computer interfaces to be truly *humane* [12], we should be free to use the software or technology as a tool, to help us do whatever we want to achieve in our daily life. The focus should be on usefulness. Technology should make our lives easier, and right now it does not. Back in 1994, David Gelernter wrote that "Having reduced your affairs to software, software can take care of them for you" [7]. Today, our lives are more digital than ever, with our news, bills, subscriptions, music and entertainment media all existing as 1s and 0s. Almost every company or service we interact with offers its own smartphone app and web portal, and so many of our domestic devices have their own Wi-Fi connectivity and storage. Yet software does not take care of this complex web of apps, logins, and devices for us, as Gelernter hoped. Technology has made life more complex. We now have chat services that can't talk to each other, social networks that limit which friends we can interact with, devices with limits on how we can use them, music we can't share or copy, newspapers and games that require us to view ads or pay fees to progress, books we can't swap or give away, and TV shows and movies we don't own. The Internet promised us free-flowing information, but now it's been divided and segregated, with barriers, signups and paywalls everywhere [10]. Reducing your life to digital data means losing control of it. We give our data away to corporations, and in exchange for free services, we lose our agency over it. Our implicit giving of consent to other parties to hold and use our data becomes a *point of severance* [9] beyond which we lose our ability to act autonomously. Paradigms that challenge this approach to data handling, such as keeping our data in personal data lockers that we control [13,14], have yet to catch on.

Unfortunately, service providers are commercially incentivized to limit what we can do with our dissociated personal data: offering a freer level of access to our data can be sold as a premium offering or subscription-only feature, and keeping our data trapped within a platform such as Facebook will keep us as loyal pair of eyeballs ready to view more advertisements. Table 1 shows how the data we create can become trapped and not freely usable as we go about our digital lives.

Data Trapped by	Example	Details
Application	MyFitnessPal	Fitness diary export is a premium feature
Platform	iPhone Photos	Can only access via Apple-approved apps
File format	Adobe projects	Only openable in paid Adobe software
Connectivity / Network	'Super Mario Run' game	Requires Internet connectivity to load
Physicality	Files on home PC	Only accessible via specific machine
Service	Kindle books, Netflix movies, Spotify music	Deletable from device without user consent
Specific Device	Saved routes/maps/timetables	inaccessible if battery dies or phone breaks
Paywall	Telegraph news article	Unable to read without paying
Ad views	Facebook, Twitter feeds	Must view ads along with friends' posts
Data sacrifice	Library wi-fi	Must provide name, address, email to use

Table 1: Examples of the ways your data can become trapped.

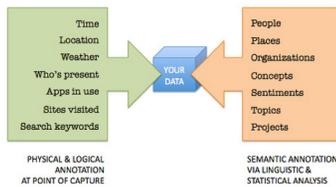


Figure 1: Both human and machine can add context to data.

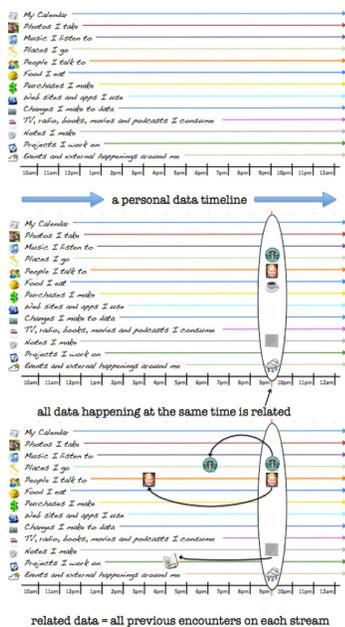


Figure 2: Lifestream concept.

Time is a unifying property against which all data can be indexed, allowing context-associative data exploration.

The Goal: Control over Your Digital Life

What is required is a realization of Weiser's 1991 vision [15]; we need to push the technology back into the background, and start building for the whole person, across all their devices and services [1], so that we can start to work around the barriers identified above and put the overall human experience at the center of design requirements. It is an unfortunate reality that the shift of software from install-at-home disks to cloud-based services has brought with it a shift in thinking from "What does *the user* want to do?" to "What do *we* want the user to do?" – thus we see end-user usefulness sacrificed in pursuit of commercial goals, as providers seek increasingly subtle ways to manipulate us through their software designs [19,20,21]. We need better technology that recognizes the value of our time [8], and the cost burdens that technology places upon us, and optimizes for giving us a more empowering relationship with our data - specifically *agency*, *negotiability* and *legibility* [11]. As yet, save a few enthusiasts in the quantified self and lifelogging communities, few have attempted to build software that exists at the level of your "whole digital life". Most providers build software as if their competitors do not exist, whereas the reality is that we all hold many accounts with many different providers. We need to recognize that as citizens, we need to have a relationship with our data itself, not just its holders; we need control and agency over our data and interfaces that take a much more human-centric perspective [5].

The Approach: How can we build for this level of Digital Complexity?

In order to design for this "chaos of multiplicity" [3] of technologies and use contexts, the first step is to

imagine interfaces that start with the human, not the technological. In pursuit of this, we can borrow an idea from productivity enthusiast David Allen who proposes that in order to get a good overview of all the things in your life requiring your attention, you can use a *placeholder* to serve as a proxy for a hard-to-access object, for example a piece of paper to represent a box of junk in the garage [2]. We see a similar idea in software engineering, where data can be handled "by reference" [16] rather than "by value" , and then that pointer can be followed when needed. This is the key to building an effective digital life interface – that even when data is still inaccessible, the user can still refer to it. Much like a search engine, it will be able to hold a representation of every important piece of data in our lives, even when the original data is offline, located elsewhere, or restricted in some way. By offering users a life-centric, holistic view over their digital life, and useful shortcut ways to access specific data or content, rather than an app-centric or device-centric view which does not give a complete picture, we can offer a more useful experience to users. A simple example would be a contact interface that lets you see all your friends and colleagues in one place, regardless of which communication media or social channels they use.

Another key element of the solution will involve the computer having a better understanding of what our data means to us, so that we can access it associatively by what it means, not its file format, storage location or application. *Metadata* is key; smartphones now allow additional details such as geolocation or presence to be stored along with data. With *semantic analysis* capabilities, computers can learn even more about the meaning of our data, allowing us to build interfaces that work like the human mind, dealing in terms of

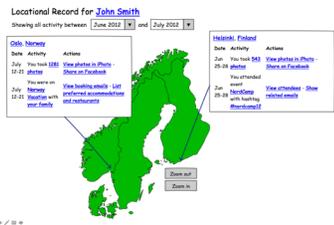


Figure 3: Locational Interface.

events, people, locations and activities rather than files, apps, and devices. **Figure 1** shows how we can view data as something that can be given greater meaning from a variety of sources. Once we have *abstracted away* [17] the complexities of our data and arranged it instead by what it means, the user's agency is vastly increased. I propose that a semantic application platform, as shown in Figure 4, could be built, which would support the creation of *free data interfaces*, that is, interfaces that allow organizational and access-level basic data interaction unhindered by technology.

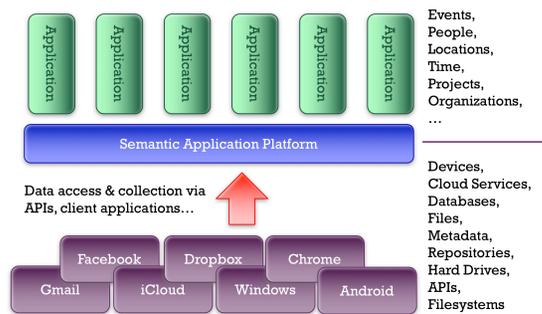


Figure 4: Concept for a semantic application platform, allowing users to interact with data without worrying about its physical, commercial or technical constraints .

Free Data Interaction: What's it Look Like?

By free data interaction (see panel on page 2), I mean that users should be able to interact with their data free from constraint; they can retrieve their data from any relevant starting point and move effortlessly between different associated information. One of the most obvious ways to do this would be by linking and representing data as a *lifestream* [6], as illustrated in Figure 2. Time is a natural choice as a 'linking field'

Higher resolution versions of all figures are available at <http://bit.ly/free-data-figures>

which nearly all data has. By attaching everything to a timeline as a backbone (whether presented thus on screen or not) we enable powerful associative data retrieval, as described in [4]. We can also imagine *semantic dashboard* interfaces (Figure 5) which would draw together all data relating to a meaningful human concept, e.g. a vacation, rather than having to go to many different interfaces to access that data. We could also organize data by location, as imagined in Figure 3.



Figure 5: Concept for a semantic interface, focused on a human concept rather than a particular technology or service.

Conclusion: Free Data Interfaces

Mortier et al correctly identified that HCI must recognize the need for, and support, Human-Data Interaction [11], but I argue we must go further. HCI must recognize the complexity of users' digital lives in the era of myriad devices and cloud services, and, drawing on software architecture concepts such as separation of concerns [18], design interfaces that separate everyday data interaction from the technicalities of storage and transfer. This will be achievable by making trapped data indirectly addressable [16] through representative proxies.

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