

# Opening Pandora's Digital Box

SHIFTING  
METAPHORS AND  
MEDIA TO  
THE CLOUD

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CONNECTING  
THE DIGITAL  
DOTS

# Opening Pandora's Digital Box:

## SHIFTING METAPHORS AND MEDIA STORAGE TO THE CLOUD

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### Abstract

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We are opening a digital Pandora's Box.

In moving content to the cloud, content companies challenge social norms in ownership, payment, time, and place. This move toward empowered computing and shared online services is not new, and has been driven by long-term shifts in costs of digital storage, computing power, and communications across vast distances. As this ecosystem continues to develop and expand, challenges and opportunities are unfolding for consumers, content creators, and content service providers. These challenges include building new behaviors and attitudes about ownership, discovery, value of storage, offline media use, joint ownership, commoditization of services, competing with freemium business models, and licensing of content across blossoming new platforms layered on IaaS delivery. This shift may change across broad spectrums of media what it means to own content, as well as reshape the perceived need to own content. The shift also provides opportunities for new players to question what it means to create for "containers" (O'Leary, 2012) versus the past modes of creating for platforms. Content might instead spread between traditional media types and may add value with a perpetual beta mode and direct long-term connection with consumers.

The "hope" at the bottom of Pandora's Box, after everything else flies out, can be seen here as the hope of new and intriguing business models for content creation and containers, which IaaS, PaaS, and SaaS can now accelerate.

*Keywords:* IaaS, PaaS, SaaS, electronic lockers, media storage, cloud computing, digital media

## Introduction

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“Storage”: An interesting word in the context of “digital stuff.” Like the word “collect,” *storage* implies that it is our “digital stuff,” that we have ownership rights to it.

Storage, as a social metaphor, brings with it context from our daily, physical lives. It may bring to mind Public Storage units, areas under overpasses where we put the detritus of our lives: mom’s sofa, the wagon wheel coffee table that we fight over, or three rooms of furniture as we downsize homes. Storage bears echoes of [George Carlin’s 1986 comedy routine about \*stuff\* to hold our \*stuff\* in](#). He detailed how we have *stuff* everywhere and have some *stuff* that is more important than other *stuff*, which we want to keep with us always. Our *digital stuff* holds many of those same traits: we have *digital stuff* all over the place, some is more important, and some we want to keep with us always as well.

Email has become a “gateway drug” for the cloud, training users to expect abundance of digital storage. Digital storage was framed for many years as precious, to be used wisely. Previously, companies chastised their employees about using too much e-mail space through automated warning messages. Expectations have escalated since 2 MB in free email storage was offered by Hotmail in 1996. Yahoo started at 4 MB in 1997, and Gmail started its beta with 1 GB in 2004. Yahoo joined in with unlimited storage in 2007, and Google upped the game soon after with its “Infinity Plus One” storage plan, which has grown individual storage now to more than 7 GB for free unlimited storage for Gmail<sup>1</sup>. Hotmail has since moved to “ever-growing,” nearly unlimited storage, continuing to change social norms about digital storage expectations.

Entire business ecosystems have sprung up, dealing with sharing, backup, and cloud storage. These tools have shifted home and business users to consider storage issues such as ubiquity, mobility, sharing, multiple devices, and permanence. Despite these roving ambitions, most people’s work and social habits have not kept up. Products have launched to help us filter and gather our email, though the majority of users still let the content swamp us out and push into unfiltered folders.

2011 was a year of many media “cloud” storage toolset launches, with more solutions to this “problem” on the horizon. Cloud-based content storage now reaches into consumer lives as well as business services. Digital media is a growing percentage of our personal digital storage. As a digital culture, we also are rethinking storage as to digital media.

This transition brings with it a series of questions about this “problem,” and about the relationships between the consumer and cloud-based media storage in the future:

- What are the **problems** that companies and consumers are trying to solve with cloud-based media storage?
- Is this time a **transition** while we are in **changing habits** of mobility, sharing, and recommendation with tablets and smartphones?
- Is it a transition, with **different trajectories** for our existing *digital stuff* and entirely new behaviors with new acquisitions and our own digital media creations?
- How might this transition drive **permanent changes in our concepts** of content ownership, collection, and storage?
- How will this change **our willingness to pay** for storage and to **pay a premium** for ownership?

Further, playing off of the George Carlin riff on stuff drives two related questions:

- What do I expect from **the stuff I need** to manage my digital stuff?
- Is the **nature of stuff itself** changing?

The music and book media sectors have been facing these issues head-on. Their company leaders have been forced to rethink what the context and containers for our media content mean in an environment of abundance. They have been rethinking books and music in a terrain of fluid data and scarcer time. Other sectors, including video and even education, may find ideas from looking to other media platforms and sectors for pain points, challenges, and new business models.

This thought-paper continues below in three steps:

- Drivers that are accelerating cloud-based consumer media storage,
- Challenges to be met as Pandora’s Box opens, and
- Opportunities that lay beneath, beyond the popular discussions about content in the cloud.

## Cloud: Assumptions and Definitions

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Shared content and services on the Internet is not new. *Cloud computing* expands shared services with a concept of shared infrastructure elements, which deliver shared content and platforms as an interconnected system. NIST framed *cloud computing* as: “on-demand self-service, broad network access, resource pooling, rapid elasticity or expansion, and measured service” (NIST, 2012). SaaS, Software as a Service, has been expanding over the past decade. SaaS provides to customers all layers of service from infrastructure to end delivery of a web-based product. That service also can be provided in layers of infrastructure and platforms, dropping the costs of launching new businesses upfront. *Infrastructure as a Service* (IaaS) and *Platform as a Service* (PaaS) then allow other companies to launch platforms and software with scalable storage and delivery. This model can shift IT growth from a step-function, up-front capital expense to a more fluid, scalable, operating expense (Armbrust et al., 2009). These systems are deployed across four models-- public clouds, private clouds, community clouds, and hybrid clouds--all with different combinations of privacy, ownership, and sharing (NIST, 2011<sup>ii</sup>).

To the consumer, SaaS is the public face to their cloud-based media lives and habits. Consumer products—such as Netflix, Dropbox, Spotify, Tumblr, or other connected services—might be living on Amazon IaaS cloud-based servers and a connecting PaaS platform.

## Drivers Shifting our Digital Worlds

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Three long-running drivers have pushed geometric change in the market for cloud-based media storage:

- **Storage:** Costs of physical storage have plummeted, represented by [Kryder's Law](#)<sup>iii</sup>;
- **Computing Power:** More powerful and smaller form-factor computing, now in our hands as smartphones and tablets, benefiting from geometric improvement in processing capacity predicted in 1965 by [Moore's Law](#); and
- **Distance:** Costs of communicating and sharing content over distances has plummeted over that same time ([Cairncross, 1997](#))<sup>iv</sup>.

These three drivers have set the stage for our more complex current media environment of 2012.

Due to the breadth of content available, legally and illegally, consumers have built up large portfolios of existing digital content across a variety of devices and hard drives. They also have

accumulated years of DVDs and CDs. The ease of saving and storing this content previously was limited to hard drive and shelf space. Shelf space has not grown in most homes, but the low cost of hard drives has let consumer build up large amounts of *digital stuff*.

Meanwhile, consumers have owned enough hard drives over time to realize that they do not provide infinite storage life. Hard drive failure rates, estimated in mean time between failures in the millions of minutes, have shown in testing to be 2-4%/year, and even as high as 13% in a [2007 Carnegie Mellon study](#)<sup>y</sup>. In addition, digital stuff is now shared across home networks, computers, individuals, and devices.

Two other factors are shifting cloud-based media needs:

- **Mobility.** The challenge has expanded with the growth in *mobility*, as tablets and smartphones draw content and leisure time to places other than living rooms and computer screens.
- **Time.** The biggest challenge, which we will engage below as well, is the perception that consumers now *don't have time*. The time to deal with faded hard drives or figuring out how to move content from one system is of high frustration and value.

## Training and Converting our Behavior and Needs

As noted above, online SaaS tools for engaging media have been around for a while. Three drivers are moving consumers into more comfortable adoption: work, tablets, and ease of start-up alternatives.

- **Work-based Attitudes and Training:** Cloud computing on the business side has driven comfort with the Cloud. Consumers have been trained at small businesses and other work environments progressively for many years. Tools like Google Docs, Google Apps, DropBox, and Evernote have gotten individuals used to user interfaces for cloud-based working. Email in the cloud, with Yahoo and Gmail, has moved many users into the cloud with email on all devices, everywhere
- **Tablet Momentum:** Tablets have been around for many decades, but the growth since 2010 of iPads has increased expectations for users to be able to thrive without carrying around massive hard drives. iPad and Android-based tablet users expect access on each of their devices and formats. Handsome user interfaces and added-value visuals are progressively part of baseline expectations on tablet and smartphones. Increased tablet-based usage rushes more content into the cloud, instead of buying the next devices with a gigantic hard drive.

- **Cloud-Based Infrastructures and Platforms:** New services are growing off of IaaS and PaaS platforms. Shared infrastructures and platforms allow start-up cloud-based media services to launch without independent massive investment in inflexible storage and fixed infrastructures. A niche, start-up provider can perch on cloud-based IaaS infrastructures for storage and platforms.

## Challenges

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If we believed ads and websites in 2011, eager consumers are ready to connect everywhere and anywhere. Consumers and content service providers face challenges in their transition to cloud-based archiving of owned media content:

### Consumer Challenges:

#### Discovery within My Own—and Other’s—“Digital Stuff”

In the physical home, old CDs and DVDs get shoved into the back of the shelf, given to friends, or sold at yard sales. Some consumers have built 300 DVD collections, and a few have had software that helps them know what they own and where they have put it. Search has been visual, scanning the covers or spines of the collections. Concepts of discovery of our own content, as well as what to do (and IF we should pay) for old “stuff” will bring consumers to question what they need in terms of long-term access to “owned” content.

- **Books:** Discovery and sharing—even with physical storage—has become a bigger challenge with large libraries. A variety of *social cataloging* web tools have grown to help with abundant book libraries. Within the book space, a variety of tools are available, including aNobii, Shelfari, BookJetty, weRead, Goodreads, and LibraryThing. Some combine information on consumers’ physical library, recommendations from the community, and possible purchase of new digital books.

Consumers face a growing challenge of digesting their owned media. With electronic books and other media files, the physical problem escalates. Book storage online already raises the question of title-level metadata and sterile taxonomies. For example, Kindle’s iPad software shows titles, authors, and cover art images to scan through, with no ability (yet) on the iPad App to search or “folderize.”

- **Music:** Music has extended social curation and discovery with abundant new streaming SaaS offerings. Data-rich new challengers in 2011—including Spotify, MOD, and Rdio—launched their curation offerings into Facebook’s connection-rich platform. Turntable.fm

brought individuals out as live DJs, sharing mixes and songs live on Facebook with friends and strangers.



- **Video:** With video, 2011 and 2012 spurred the launch of a whole new breed of SaaS tools having to do with shared media curation of the television viewing experience. Cloud co-viewing tools continued beyond GetGlue to Yahoo's mobile IntoNow, which compares the audio of what you are watching to identify and share taste in television programs. Tunerfish, a Comcast offering, reminds users that their favorite show is on tonight as well as lets them connect to discuss the program.

## Joint Ownership

Ownership may not be to one IP address or individual. For example, I don't own most of my content. My family owns most of my CDs and DVDs in a shared cupboard in my home. We have a shared hard drive, and are building new digital home storage as we speak. Ownership, however, is shared. Even my Netflix account is shared, with my 14-year-old running the queue (much to my chagrin).

New digital services have been dealing with this issue. Audible, for example, delivers "purchased" audio books, which means rights to listen on- and off-line to audio books on their service on a variety of devices. The service allows use of up to 5 devices, which can be reset at any time. Barnes & Noble permits digital book lending for up to 14 days, but only once. UltraViolet, which has launched a multiple mode ownership system with Paramount, Universal, Sony, Warner Bros. and Lionsgate, is another example in the video realm. That new service permits up to six users in their Terms of Service agreement. They have begun to release

“Horrible Bosses” and “Green Lantern” (both Warner Bros.) since Oct. 2011 for home consumption under these rules; we’ll see if they change over time.

## Offline and Online Use

Mobile bandwidth can be expensive for consumers to use for connecting to their own media, so Wi-Fi has become a welcome alternative for connecting mobile devices with rich media content. Consumer storage has had to assume that you are not sitting at someone’s computer in a robust broadband work environment. Users want to be able to fill their tablets or smartphones as a transport bucket for this week’s reading, listening, and viewing – at least under the current models of mobile monthly bandwidth contracts.

## Content Provider:

### Commoditization of Services, Migration, and Survivability

Consumers will want perfection: permanent tools for low cost. Users will want *migration* and *survivability* if a SaaS fails, closes, or is sold, with the ability to transfer their “digital stuff” out. Consumers will be afraid of “lock in,” as it would make them dependent on the terms of use, which might change.

Meanwhile, IaaS and PaaS will allow new systems to launch, cannibalizing existing systems and putting them at business risk. Pure storage, with limited barriers to entry, can be a race to the bottom in terms of both service and pricing

### Competing with Freemium

Many digital consumers have become trained to seek freemium business models, which give them a fairly large bucket of storage for free with extended product abilities and storage for a certain amount per month. Dropbox, which has gained market share with its integration with the iPad, provides 2 GB for free, with more storage given for referrals (up to 5.5 GB), and even more for pay or for organizations. Amazon’s CloudDrive is free for 5 GB, while Microsoft’s SkyDrive offers 25 GB for free.

### Device Abundance from the Consumerization of IT

Increasingly, many consumers have gained the attitudes that their device is their stronghold and they have the right to use it for work and home. Publishers for mobile have been working on this

question for years, and entire ecosystem layers have stepped into media platforms to digest digital output into the various carriers and devices.

## **Mutual Challenges:**

### **Licensing:**

Per the Betamax Case in 1984, users have the right to make a personal copy for their own use and time shifting. Questions repeat as to who owns what with what rights to digital copy, on what drive in what location. As noted above, different companies are setting different rights rules as to cloud-based media. As a consumer, the pitch seems to be rights to my *stuff* anywhere, everywhere, and all the time. Start-ups, especially in music, have been pushing back on the physical-media based licensing structures while trying to launch readily on IaaS backbones.

In music, Echo Nest has launched a PaaS that connects licensing rights with new music platforms. So far, however, it only has EMI (which now has been sold) as its core. 220 young start-ups so far have launched new SaaS services based on this Echo Nest PaaS licensing-fluid platform.

## **Changing Metaphors, Belief, and Habits**

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One core challenge is how new habits will affect the long-term economic value of owning product. Jeff Zucker's 2008 concern of finding ways to make money online to that "we do not end up trading analog dollars for digital pennies<sup>vi</sup>" has proved quite valid.

### **Challenge: Meaning and Need of Owning Digital Media**

In the music and book spaces, consumers and content platforms have been renegotiating what it means to "own," "borrow," and "buy":

### **Music**

Music already has faced this conundrum and, in perception, lost. The business has shifted to singles; units have increased, rising to 1.6 billion music units in 2011. 331 million of those were albums, down from 943 million CDs at the peak in 2000 (RIAA).

In the music space, streaming with Pandora and Spotify is retraining young consumers that they don't need to own music. They instead can access it in an ad-based model, whenever and

wherever they want. With Spotify and other services, they also gain the connected ability to search and curate with others as well.

Meanwhile, 2011 was the year of the music locker for old libraries. New services have launched, trying to train consumers to come into their ecospheres:

- **Google:** Google Music launched in 2011, where you can “discover, buy and share music, wherever you want, whenever you want” and “rediscover your own library by creating an Instant Mix.” It acknowledged the relationships between music and clogging our hard drives: “With your music saved online, you have even more space for all the other things you love.”
- **Amazon:** Amazon’s CloudDrive, launched in 2011, offers 5 GB for free and bills it as “your personal hard drive in the cloud,” where you “never worry about losing your files again.” Their pitch is a fear of loss across a broader set of media.
- **Apple:** With its launch of iTunes Match, Apple upped the game in November 2011, with a \$25 a year service that not only “lets you store your entire collection,” but also since “most of your music is probably already in iCloud...all you have to upload is what iTunes can’t match. Which is much faster than starting from scratch.”

## Books

The book sector stands at a different point. In the U.S., the book market has shifted to a digital purchase model very quickly, with Amazon selling more Kindle books than it sells hardbound or softcover already. The book world stands between two digital ecosystems—Apple and Amazon—acting like *splinternets* in that users and content creators need to fit into these closed systems.

For example, by choosing Kindle as my book purchasing mode, I need to play by their ownership rules. I feel I own my Kindle books, though my ownership rights are limited and it is “in Amazon we trust” to maintain access if I have a hard-drive crash.

## Games

Games have been available through the cloud for some time. In 2005, G-cluster (Gaming Cluster) launched its first commercial deployment of cloud gaming in Europe. Steam came into the picture later, providing instant access to more than 1,800 games to its 35 million active users. Gaikai further expands cloud gaming in deals with EA, Wal\*Mart, Eurogamer, and Capcom. OnLive recently launched mobile cloud-based games. The desire to play a complex

game across platforms has driven a variety of SaaS solutions over time, challenging due to many games' heavy processing and visual graphics needs.

## Big File Media

For television series and movies, this question is at a turning point. DVD sales have dropped 46% from their 2006 peak, according to IHS Screen Digest. Individual households own vast libraries of content that they have paid good money for, and will be looking for transitional solutions. Consumers' time, however, can be spent instead in new streaming tools that do not care if they already own a piece of content.

### **Challenge: Fates of Owned Media Owned vs. Newly Purchased Media**

Will it be worth the consumer's while to convert old to new? Time and convenience have been trumping cost in many instances. iCloud from iTunes, for example, provides clean tracks to replace ones you already have in your physical storage for the cloud.

UltraViolet, in the film realm, has approached this transition with a mixed package. Buy a DVD and gain rights to using the content in any mode, including online. The fine print on the online is for a year, with rights then to be renewed for an undisclosed sum of money.

Consumers, with available freemium storage space over 5 GB now, are being trained by the marketplace to not pay for digital storage. Will users pay a premium to store their digital stuff, or judge whether they will use something a second time?

Other forces are training consumers to "borrow" content, for one-time use. Video on demand has not performed as many early analysts predicted a dozen years ago, but provides a single-use option with much less revenue to the studio or producer. The TV Everywhere initiatives by many of the cable companies, including HBO Go, are training consumers for subscription-based extensions into the mobile world from their video services. Netflix's 24 million subscribers (3Q2011) and Hulu's 1 million premium subscribers are all following the call of renting a package of experiences. All of these services provide robust ways to not "buy" anymore, with a strong connection and even tethered in many off-line environments.

### **Challenge: Usage Models for "Buying" Versus "Renting"**

Questions of ownership may have more to do with usage models instead of media segments. Products may need to address different aspects of the consumer relationship, especially need for multiple sittings to consume the content (e.g., books, games, and classes). Ownership may



## Data between User, Content Metadata, and Place

Privacy, a concern with content in the cloud, becomes more sensitive when the cloud can tell what you are doing, where and when. The transition now to mobile consumption adds a layer of value to the SaaS: Services can figure out what users are listening to or watching right before they make a purchase decision at a location. The content consumed, combined with behavior patterns, shares with that service both psychographics and decision-patterns. Not only are consumers not using the content “privately,” but they also are sharing vast amounts of data about propensity to act and purchase. This adjacency to decisions will be of extreme value as these models mature and the data market ripens.

## Rethinking Creating and “Containers”

Work flow for creation may have shifted to more digital pathways, but most discussions assume a formal media delivery of a finished, locked product. Products have rules based on their media segment, with set delivery dates and SKUs.

With content stored in the cloud, the opportunity expands. Creators are not confined to street dates, final publications, and locked definitions of videos, books, music, games, and the like.

One example is in the changing book sector. Enhanced books, now being distributed through major online outlets, bring this question to the forefront. [Brian O'Leary](#), in the 2012 [Book: A Futurist Manifesto](#), specifically questions the “container.” In the past, book creation systems have assumed a specific context of delivery. Books have been designed around a single type of output, delivery date, and life after production. O'Leary calls these assumptions *pre-artifact*, *artifact*, and *post-artifact*. He examines the possibilities of what can be re-envisioned if the container is variable, and if the content is created to be able to live socially during production, at distribution, and for its ongoing life.

The intriguing concept here goes beyond digital workflow before a product is released, and digital fingerprinting and social media analysis after release in a cloud world. The concept becomes broader. Delivery rules become fluid, separate, and distinct from content creation. A media product, just like web-based software now, could be in perpetual beta. Product can be changed and amended before release and after release, with part of the ownership being updates in content and possibly sequels and extensions. This could be a premium business model, further connecting the consumer with the content creator, or separating them by enhanced re-aggregation. PaaS and SaaS options could be created to be perpetual engagements with multiplatform products, as these begin to blur between categories.

If we begin to rethink time-locked containers, we begin to see different delivery mechanisms that may have much longer product life than our increasingly quick velocity of new products being released and spun into history in this current mode of digital delivery.

**Added Value: Blend with Live:** Value and relationship with the consumer can also blend cloud-based, connected services with live experiences. Alternative Reality Games, such as 42 Entertainment’s Dark Knight engagement several years ago, blended online and live activities for 18 months. Music has been doing this in its own way already, with an engaging business model. VIP memberships are gaining certain fans integrated consumption of live and online relationships—great concert tickets, premium virtual goods, distinctive merchandise, and live engagements with the artists.

**Added Value: Premium Context:** O’Leary also points out that there is benefit to re-adding context to the content. With books, digital delivery is both stripping away formatting for distribution as well as making some formats more context-driven. iPad delivery looks and feels different than Android. Premium products, off of the same core content, are becoming the norm with distinctive features in different platforms. These high-touch interactive differences by platform are becoming another ecosystem on top of these cloud deliveries. Authoring tools are in beta to help creative producers and publishers provide high touch interactive engagement with the same product that they are having to make available to simpler digital delivery methods. Each of these delivery modes, in the meantime, need digital workflow to keep all of this straight, before, during, and after delivery.

We already are breaking open the container—the intriguing opportunity here is breaking open its locked nature of being “done” and “alone.” It also can be more than a “movie” or “book,” as we are able to step between definitions – launching interactive book products blending images, video, books, and interactivity as an example, if you don’t have to stay in locked format containers.

## Conclusion

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By bringing content from our hard drives to the cloud, we have the potential to open Pandora’s Box. By having infrastructures and platforms shared with new innovators, we have the potential to blur traditional boxes of delivery and of locked content. By changing our consumption from our own “storage” and “ownership” to “just” the concept of cloud-based storage, we are in the midst of changing habits and attitudes of more than just “buy” versus “stream,” but also of what it means to be distributing, creating, producing, and engaging.

Now that we are opening Pandora's Box, we shouldn't be startled that consumers find a different type of "hope" in the bottom.

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<sup>i</sup> Now adding 3.3 MB each day to the limit, per Google.

<sup>ii</sup> National Institute of Standards and Technology's (NIST) working definition of cloud computing, the 16th and final definition has been published as [The NIST Definition of Cloud Computing](#) (NIST Special Publication 800-145).

<sup>iii</sup> Chip Walter (2005, July 25). "[Kryder's Law: The doubling of processor speed every 18 months is a snail's pace compared with rising hard-disk capacity, and Mark Kryder plans to squeeze in even more bits,](#)" *Scientific American*.

<sup>iv</sup> Francis Cairncross (1997). *The Death of Distance: How the Communications Revolution Will Change Our Lives* (Boston, MA: Harvard Business School Press).

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<sup>v</sup> Bianca Schroeder and Garth A. Gibson (2007). "Disc failures in the real world: What does an MTTF of 1,000,000 hours mean to you?" *5th USENIX Conference on File and Storage Technologies*, p. 1-16.

<sup>vi</sup> Brian Stelter (2008, January 29). "[Forest Fire: Zucker Sees Strike as an Opportunity for Change,](#)" *New York Times*.